DoD Installation Energy Self-reliance, a Matter of National Security

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Abstract

The repurposing of existing Naval nuclear power generators as installation electrical power sources has the potential to accelerate DoD's energy independence, reduce installation carbon footprint, and improve installation energy economics. In an era of mounting constraints and increased vulnerability, a business transformation initiative to make the DoD 100% self-sufficient in electrical generation beginning operation by FY2012 is critical to the nation's security. Investment to evaluate the approach is a low risk with very high payoff potential.

The Challenge: The DoD's installations rely on a central power grid that is vulnerable, outdated and in the control of 5,000 utilities and independent power producers. This poses a severe national security risk. According to the DSB, the "almost complete dependence of military installations on a fragile and vulnerable commercial power grid places critical military and homeland defense missions at an unacceptably high risk of extended disruption". The DSB advised the DoD to replace reliance with onsite, independent, power supplies in netted, 'islandable', microgrids. Additionally, increasing energy efficiency while reducing the carbon footprint is the DoD's top high priority performance goal. The DoD is required to reduce installation energy intensity by FY15 to 30% below FY03 levels (EO 13423). The DoD is also assessing a number of power generation alternatives: wind, solar and geothermal to meets it goals. DoD must transition to a modern, secure and efficient electrical infrastructure with a zero carbon foot-print at all military installations.

Solution: The DoD currently operates over 100 nuclear power generators, primarily for ship and submarine propulsion. The power generators have over 50 years of operational history using proven technology under conditions far more demanding than commercial land based nuclear power plants. They are rugged, compact, reliable, and safe. Over 40,000 personnel have been trained to operate these reactors. The U.S. Navy has operated more nuclear reactors than any other entity with no known nuclear power incidents. We recommend the DoD commission a continuous process improvement assessment to determine the feasibility and processes for re-commissioning and implementing existing DoD nuclear power generators achieve 'island microgrids' at five major high priority installations by FY2013.

Key Strategic Questions

What are the political challenges? Nuclear generated electrical power attracts political challenges, often in the form of legal action, as with other power generation infrastructure initiatives. This aspect has slowed the development of domestic power infrastructure, including nuclear power, and has extended the timeline for building and licensing new power plants. In spite of this aspect, nuclear power currently generates about 11% of US electrical power. Expanding nuclear power is a part of the US energy strategy and is garnering growing appeal as a domestic, non carbon polluting, and reliable power source. We must understand all political issues that impact the viability.

What are the budget considerations? DoD is under increasing pressure to reduce installation costs. Power generation can have a significant start up cost as well as primary and secondary maintenance and environmental costs. Frequently the lowest

cost per KW hour generated is the highest polluting in terms of carbon footprint. Power generation should be a fertile area for public-private partnership, and of potential mutual benefit to the military installation and civilian community. The fully loaded lifecycle cost should be compared with other alternatives

What are the local impacts? Power generation is subject to local and regional regulatory domain. Military installations exist in a dynamic balance with their local community. Activity on regional installations can have a major impact locally. The last US nuclear power plant (River Bend, LA) was in begun in 1977 and was commissioned in 1996. Local considerations were a significant factor. Local impact of nuclear power generation on military installations should be addressed as a critical element of the assessment.

Proposed Assessment Approach Bring together US naval nuclear propulsion, commercial power generation, and smart grid subject matter experts to assess the critical issues:

- ✓ Technical constraints surrounding re-purposing DoD power generation through reuse and recycling of existing 'off the shelf' technology.
- ✓ Political and regulatory issues that could impact the viability of a significantly reduced DoD carbon footprint.
- ✓ Economic viability as compared to other alternative and fossil fuel-based energy sources
- ✓ Interrelationship with commercial utilities in the in rapid deployment compared to long-lead time for new 'pocket' nuclear power generators.
- ✓ Impact on security of DoD and the nation from accidental and deliberate outages by creating independent installation power sources and 'microgrids'.
- ✓ Benefits, costs and risks of securing the DoD with a 'bridge' while newer, innovative technologies are developed, tested, approved and deployed.

The assessment will be broken down into six critical areas. These areas will be evaluated over a six month period. The results will be an integrated decision road map to provide the DoD will a clear picture of issues, resolutions and timeframes.

1. *Technical Assessment*. Assess the technical feasibility, processes and time required to re-purpose Naval power systems as a military installation power source.

2. *Policy and Regulatory Assessment*. Verify the political will to pursue a re-commissioned nuclear power generation option to accelerate DoD energy

security and self-sufficiency. . The team will meet with the political leadership, regulatory staff and DoD leadership to develop a road map of the issues that must be addressed to garner support.

3. *Economic Assessment*. Determine the economic viability of re-commissioning Naval nuclear power generators. The assessment will include facilities build-out, operations and interface with other 'islands' and the commercial grid and comparative analysis of other energy sources. The re-commissioning of these generators is considered an interim solution until viable alternatives are developed to support the demands of the DoD as a result the economic assessment will include the cost benefit trade-off for a 10 year bridge solution.

4. *Commercial Power Industry Partnership.* The team will work with public electrical companies to determine the impact, benefits and interrelationship of DoD self-sufficient facilities with the commercial grid and implementation of smart-grid technology within the installation infrastructure. The assessment will also evaluate the interrelationship between DoD and the engineering and construction companies that have nuclear facilities build-out expertise.

5. *Security Assessment*. For this aspect of the evaluation the team will work with key DoD staff to determine where accelerated implementation of the re-commissioned generators can best serve the security needs of the DoD.

6. *Pilot Implementation*. The team will deliver a road map of best practices across all the six critical areas that will assure timely, safe and reliable implementation of 3-4 pilot energy islands using the re-commissioned power generators to power the micro-grids.

Benefits Vital decisions must be made to protect DoD installations from commercial grid vulnerabilities. DoD's energy electrical grid self-sufficiency will be will derived from a combination of renewable and conventional energy sources. Even with a massive expansion of renewable energy and energy conservation, there will still be a gap. Re-purposing Naval nuclear generators may prove to be a viable interim step to fill the gap. A thorough assessment of the alternative has the potential to fast-track DoD electrical power independence and drive the transformation of the nation to secure smart microgrids. If proven feasible such an approach will:

- ✓ Eliminate a critical strategic vulnerability
- ✓ Increase DoD energy efficiency, reliability, and security
- ✓ Achieve a near zero carbon output
- ✓ Realize assurance and independence from the commercial power grid.

- ✓ Increase energy cost stability.

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