

## U.S. Navy Smart-Grid: Designing for Enterprise Integration, Cybersecurity, and Resiliency

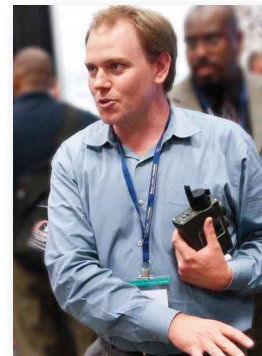
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#### Abstract:

To reduce energy costs, increase operational efficiencies, provide control systems (CS)/ operational technology (OT) cybersecurity, and improve U.S. Naval Shore Enterprise resiliency, the U.S. Navy has embarked on an advanced effort to build enterprise “Smart-Grid.” This smart-grid will be deployed across the U.S. Naval Enterprise, in a priority manner, from Norfolk to Guam. This presentation on U.S. Navy Smart-Grid capability development will give an introduction to the system (objective and scope), detail the prototyping, requirements development, and systems engineering processes, detail the design and implementation to-date, discuss future plans, compare to academic smart-grids (University of California, Riverside and University of California, San Diego), and provide insight into system challenges and “lessons learned.” The U.S. Navy Smart-Grid is a leading edge system that has the potential to transform the way the Naval Shore enterprise both day-to-day and in crisis, but the design process and detailed considerations presented here should be taken to heart toward implementation success.



Dr. Christopher H. Clark

#### Biography:

Dr. Clark is chemical engineer by training who has spent much of his career in development of energy technologies and energy systems. For the last 5+ years, Dr. Clark has been working on developing requirements and performing systems engineering tasks for Naval Facilities Command (NAVFAC), Commander, Naval Installations Command (CNIC), and Naval Sea Systems Command (NAVSEA), for advanced metering infrastructure (AMI), utilities management, smart-grids, industrial control systems (ICS) integration, and ICS cybersecurity. The focus of Dr. Clark’s current work and research is in ICS cybersecurity and integration toward improved operational efficiency and resiliency, both ashore and afloat.

Dr. Clark earned his bachelor’s and master’s degree in Chemical Engineering from West Virginia University, and earned his Ph.D. in Chemical and Environmental Engineering from the University of California, Riverside.



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