



Enterprise Energy Information Systems and Management

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14. ABSTRACT Recognizing that energy is a strategic resource, the Department of the Navy has set aggressive energy goals to achieve our objectives. At the same time, we must meet a multitude of federal energy laws designed to decrease our dependence on fossil fuels. The Navy's Shore Energy Strategy is to assure our energy security while meeting our goals and legal requirements by focusing on energy efficiency; transforming our culture and behavior; and integrating sustainable infrastructure and viable renewable energy systems. The Naval District Washington (NDW) working with Commander Naval Installations Command (CNIC) and the Naval Facilities Engineering Command (NAVFAC) has embarked on a series of related projects designed to maximize energy and personnel resources, while leveraging proven new technologies with the goal of achieving significant reductions in energy utilization and provide for enhanced security and responsiveness of the base/installation infrastructure support organization. At the heart of this effort is the Navy's SmartGrid Pilot Program in NDW being spearheaded by the NDW Regional Chief Information Officer (N6) and the NDW Regional Engineer (N4). The Navy SmartGrid Pilot will bring together the foundational SmartGrid Platform IT technologies, such as Enterprise Industrial Control Systems (EICS), Advanced Metering Infrastructure (AMI), and Virtual Perimeter Monitoring System (VPMS) solutions that NDW has been implementing throughout the Region, along with integration efforts with existing and proposed NAVFAC Business Systems. In addition NDW is expanding the integration of other Shore Platform Systems such as Access Control Systems and the integration of other building automation systems such as lighting control and elevator control systems into an expanded solution called Cognitive Energy Management solutions (CEMS).		
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Agenda



1

NDW Shore Energy Strategy/CONOPS

2

Current NDW Pilot Projects

3

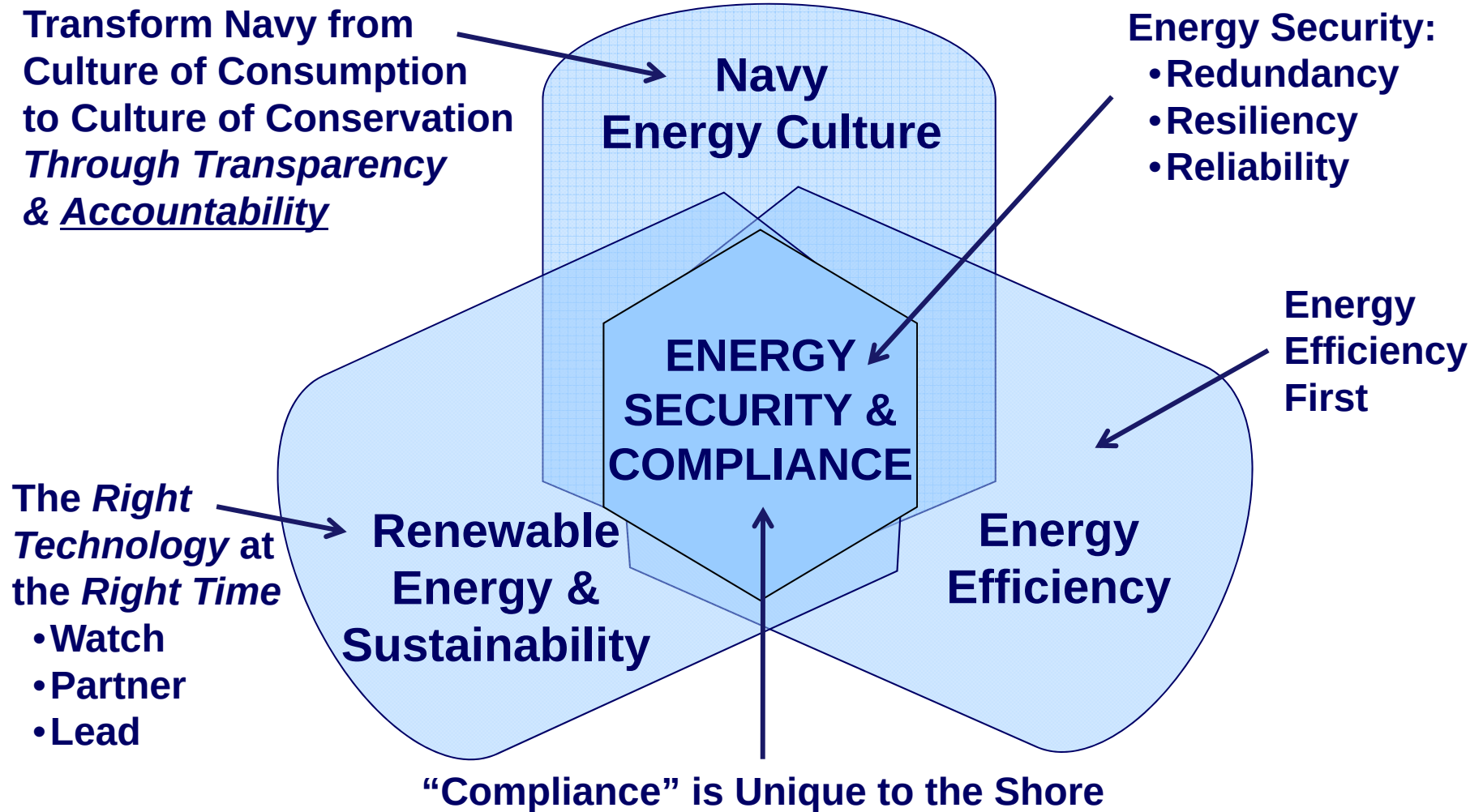
Future NDW Pilot Projects

4

Navy SmartGrid Video



Navy Shore Energy Strategy





NDW SmartEnergy CONOPS



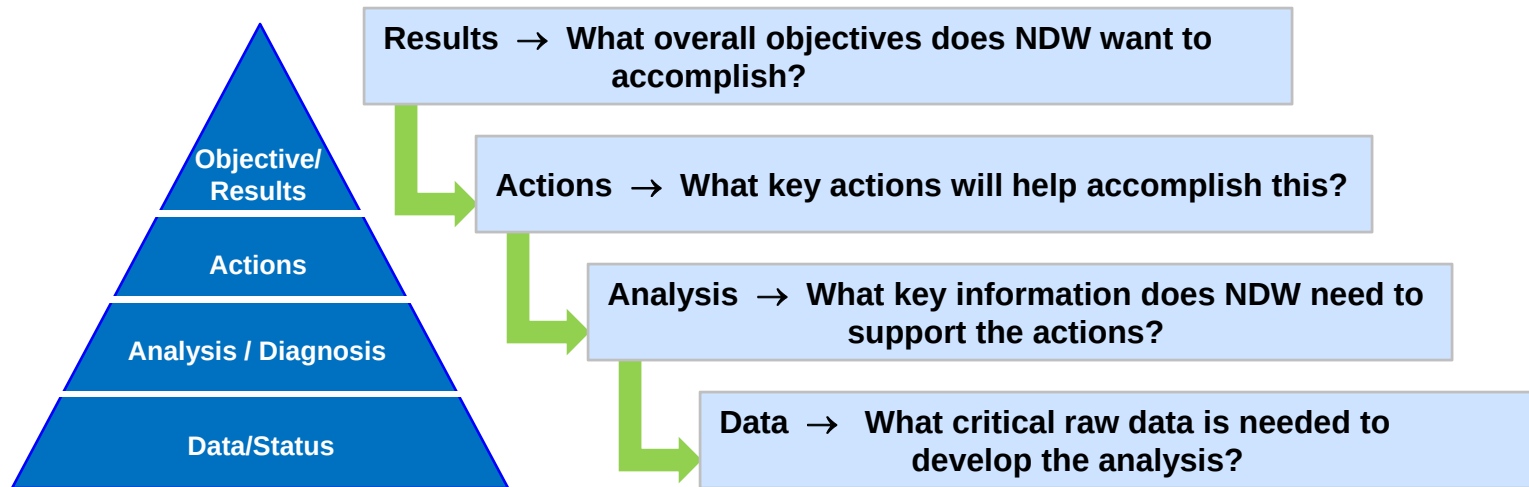
CONOPS

- The NDW SmartEnergy CONOPS defines analysis of collected data to determine appropriate actions in support of the Region's overall objectives.

Objectives

- Reduce **energy costs** without impacting mission, thereby also reducing energy consumption
- Reduce **O&M** costs without impacting mission
- Change **operational behavior** regarding energy to allow transparent decisions regarding energy-saving opportunities

Approach



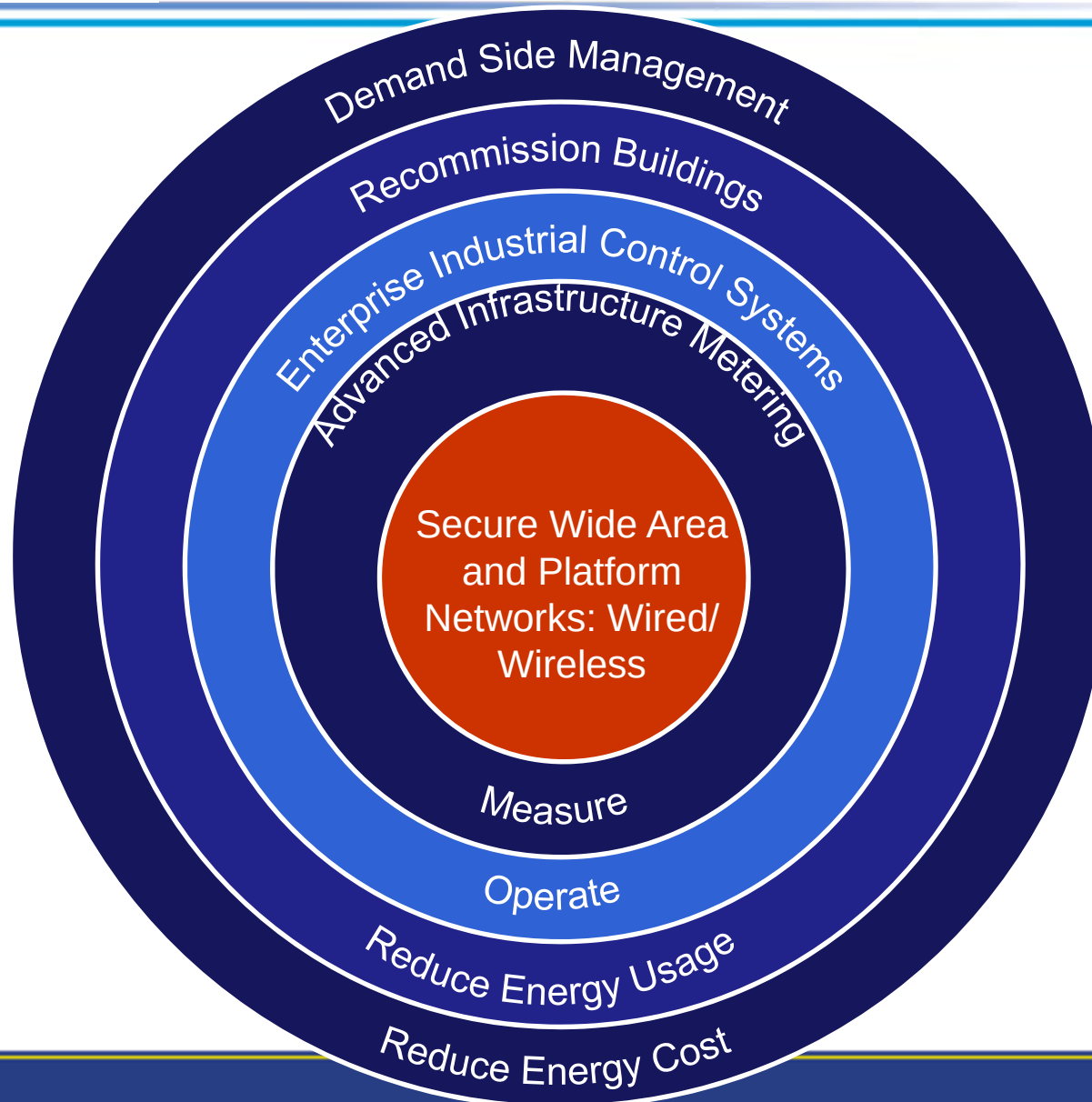
SmartEnergy

The combination of:

- SmartMeters, direct digital control (DDC) of HVAC, lighting controls, advanced metering infrastructure (AMI), supervisory control and data acquisition (SCADA) for high-voltage utility components,
- Coupled with a robust networked communications backbone,
- Allowing enhanced digital control of all aspects of the Region's energy infrastructure.



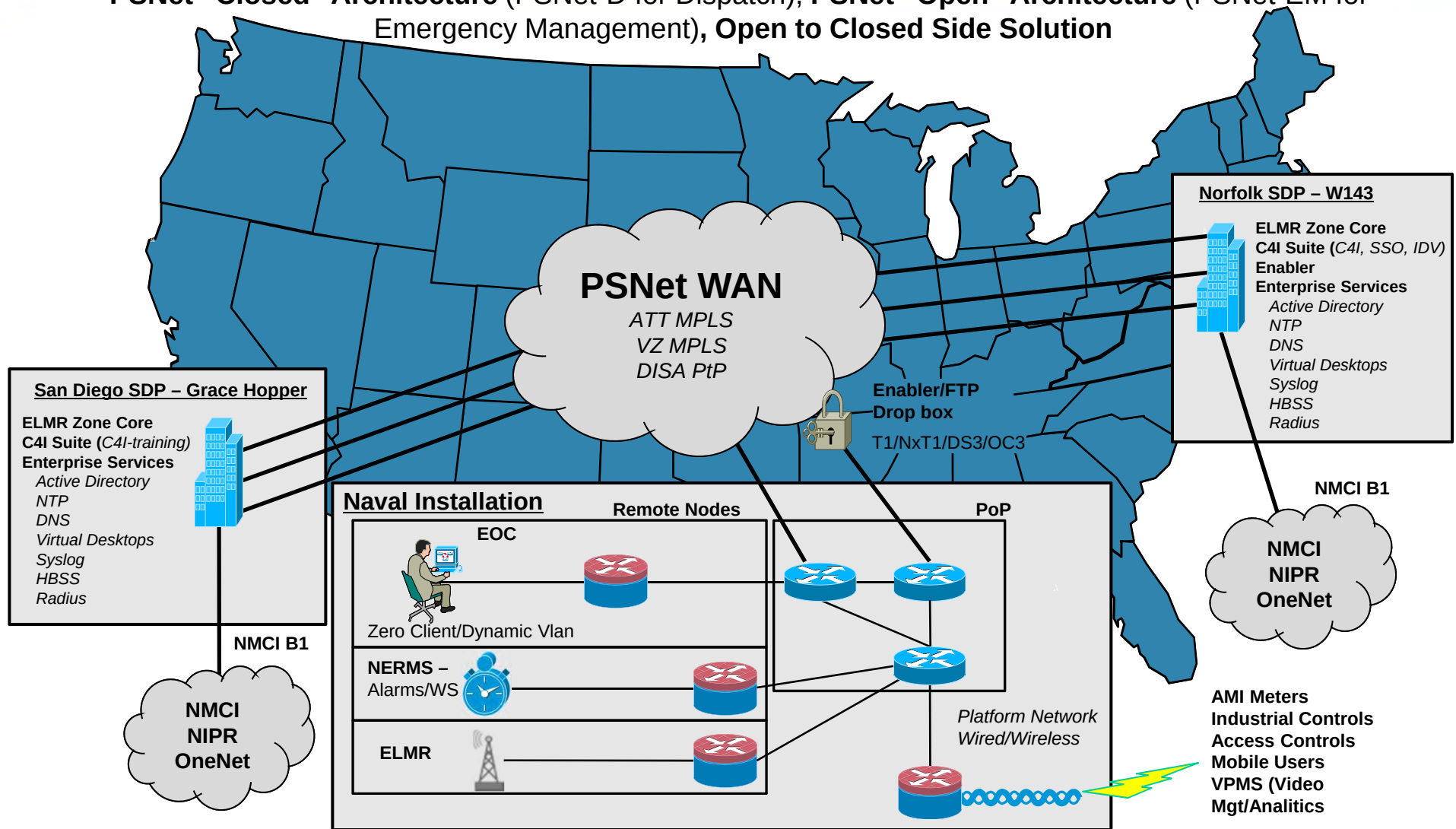
NDW SmartEnergy Initial Strategy





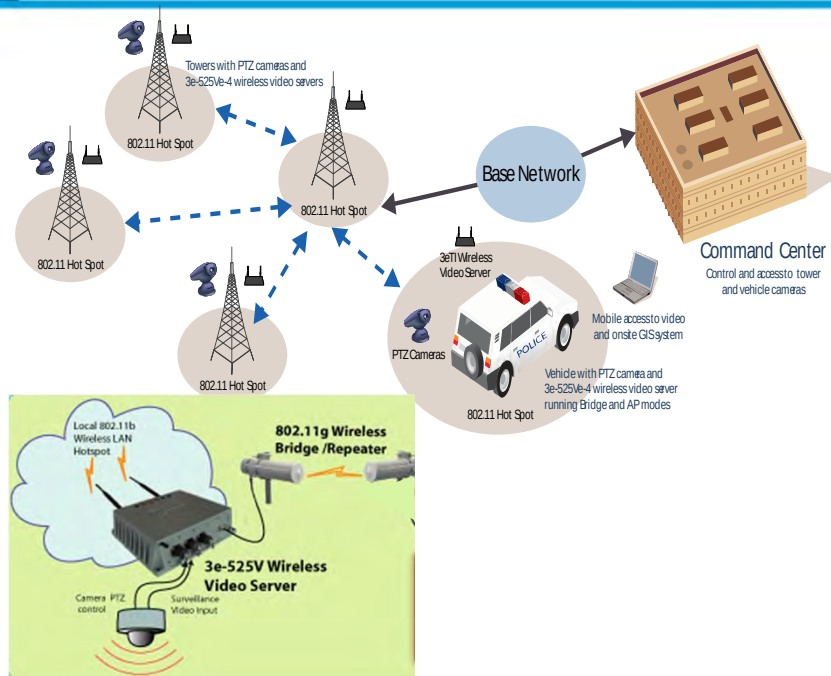
Shore Network Architecture

PSNet “Closed” Architecture (PSNet-D for Dispatch), PSNet “Open” Architecture (PSNet-EM for Emergency Management), Open to Closed Side Solution





Sensor Networks and Critical Infrastructure Monitoring & VPMS



- Foundational Wired and Wireless Networking for Sensor Systems
- Critical Infrastructure Protection via wired and wireless sensors for:
 - Military Bases / Federal Campuses
 - Water Towers/Wells, Tank Farms
 - Substations, Wastewater, Pumping Stations

Features

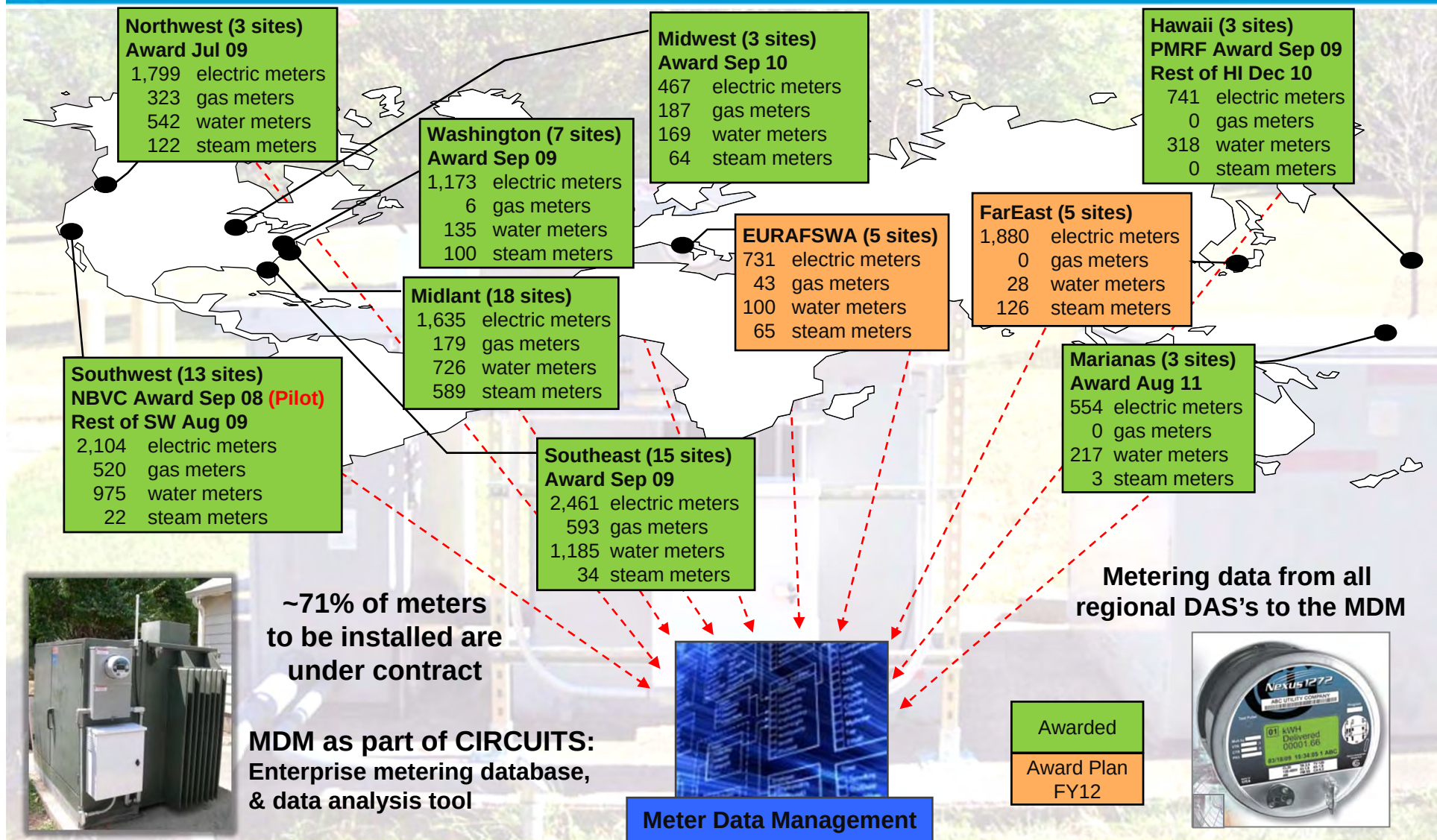
- A “virtual” impenetrable fence that detects and then alerts when intruders enter site
 - Simple, bolt-on, out-of-the-box wireless video surveillance system for protecting critical infrastructure
 - Video analysis and automated intruder detection/alert
- Enhanced monitoring with simultaneous access to multiple cameras/video screens
- Wireless Network for Mobile and Fixed Sites
- Certified, standards-based security
 - DoD/Federal agency compliance to FIPS 140-2 & Common Criteria EAL4
 - Platform IT (PIT) designated and Platform IT Risk Acceptance Approved by NETWARCOM

Deployments

- Naval District Washington (NDW)
- Naval Station Guantanamo Bay
- Network Leveraged for AMI Navy wide

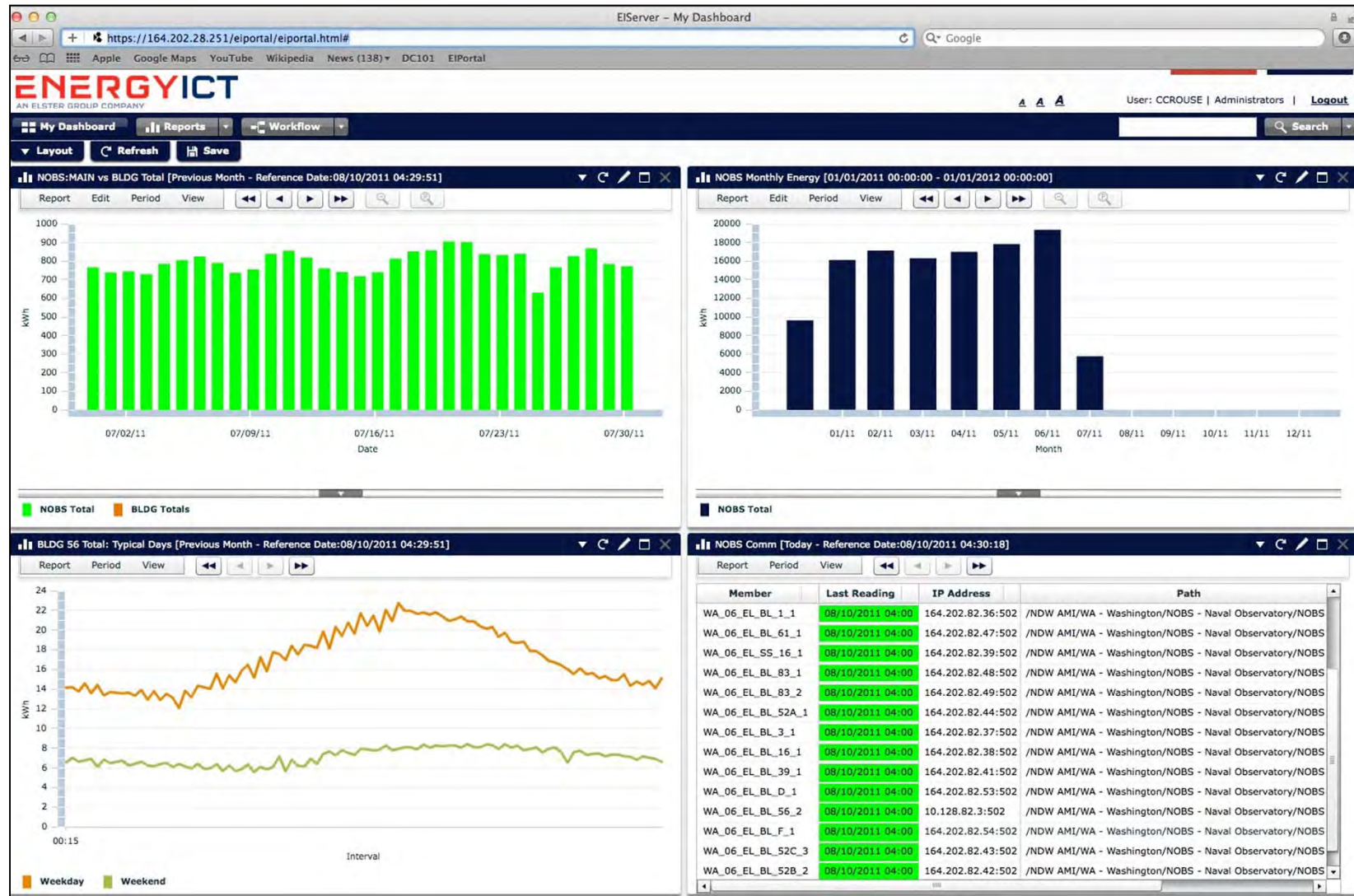


Navy Advanced Metering (AMI)





Energy ICT Web Portal





Enterprise Industrial Controls Systems (ICS)



Mission

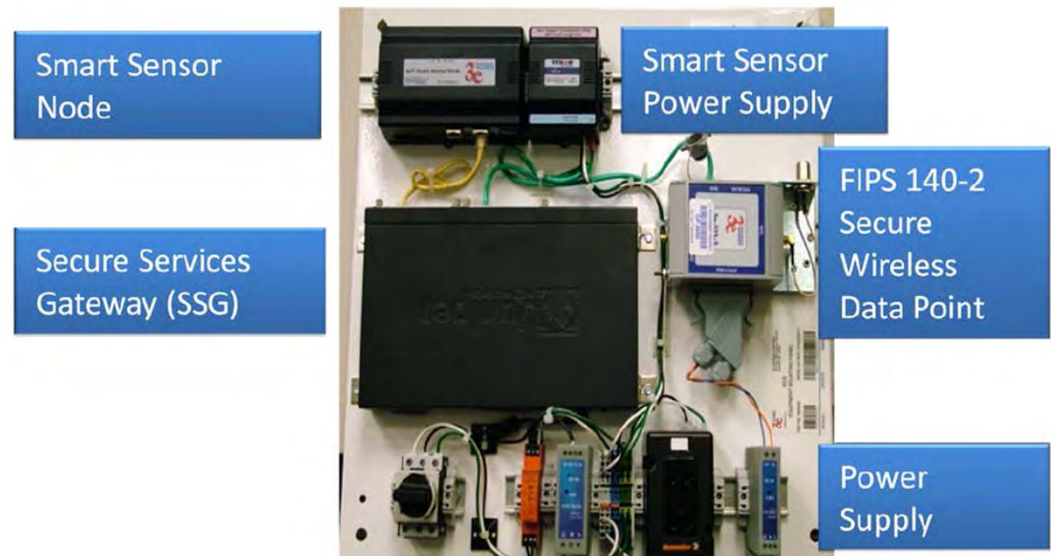
- Centralized energy monitoring capability integrating DDC & SCADA systems in support of Region Energy Reduction Initiatives
- EICS model scalable for Navy enterprise-wide deployment

Capabilities

- Integrated EICS solutions
- Critical Infrastructure Monitoring using advanced camera technology

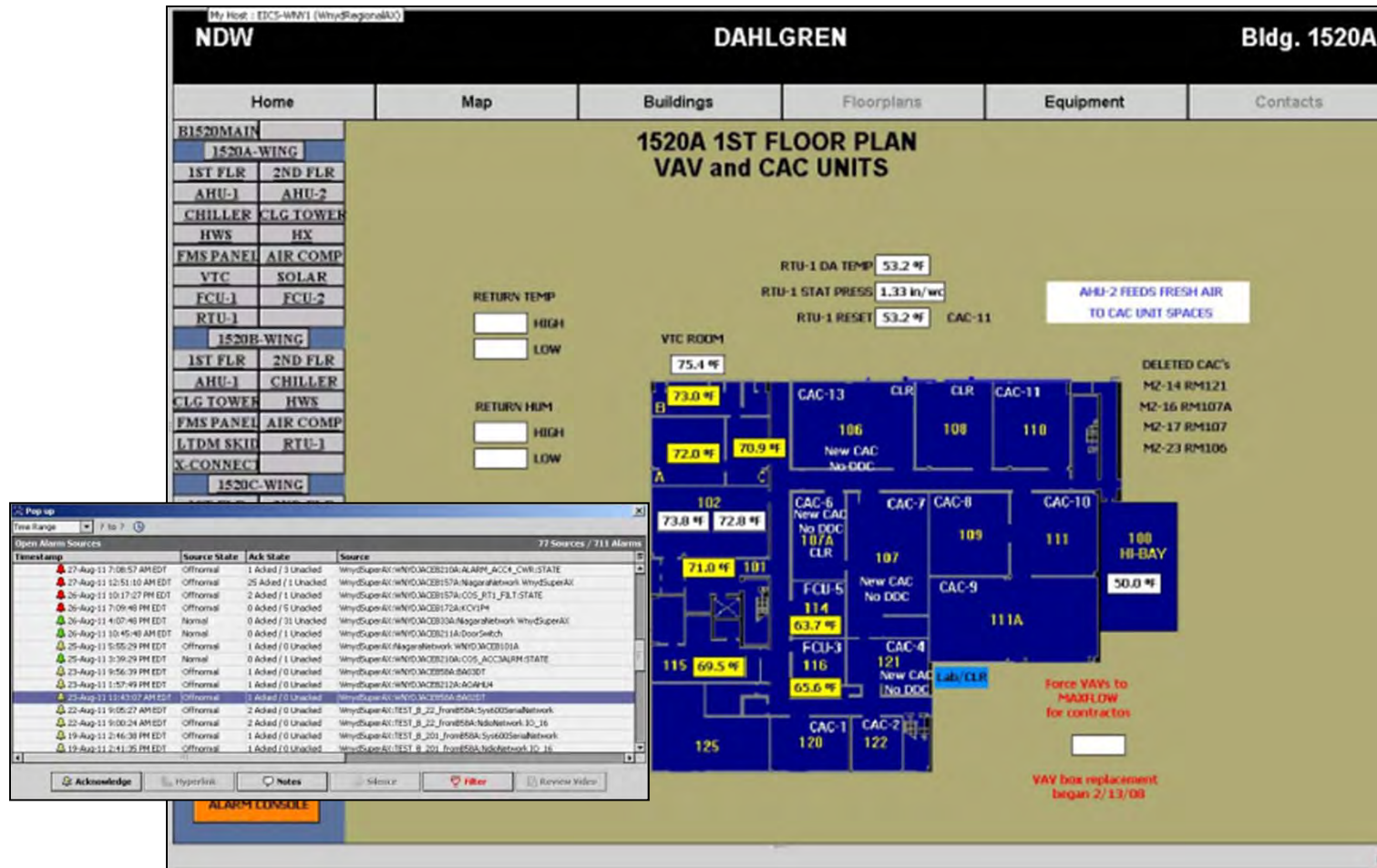
EICS Subsystems

- Wireless Mesh Network
- “PSNET” Network Interface & Firewall
- Networked Programmable Logic Controller (PLC)
- Legacy DDC PLCs and Secondary Controllers
- EICS Management Server & Graphical User Interface



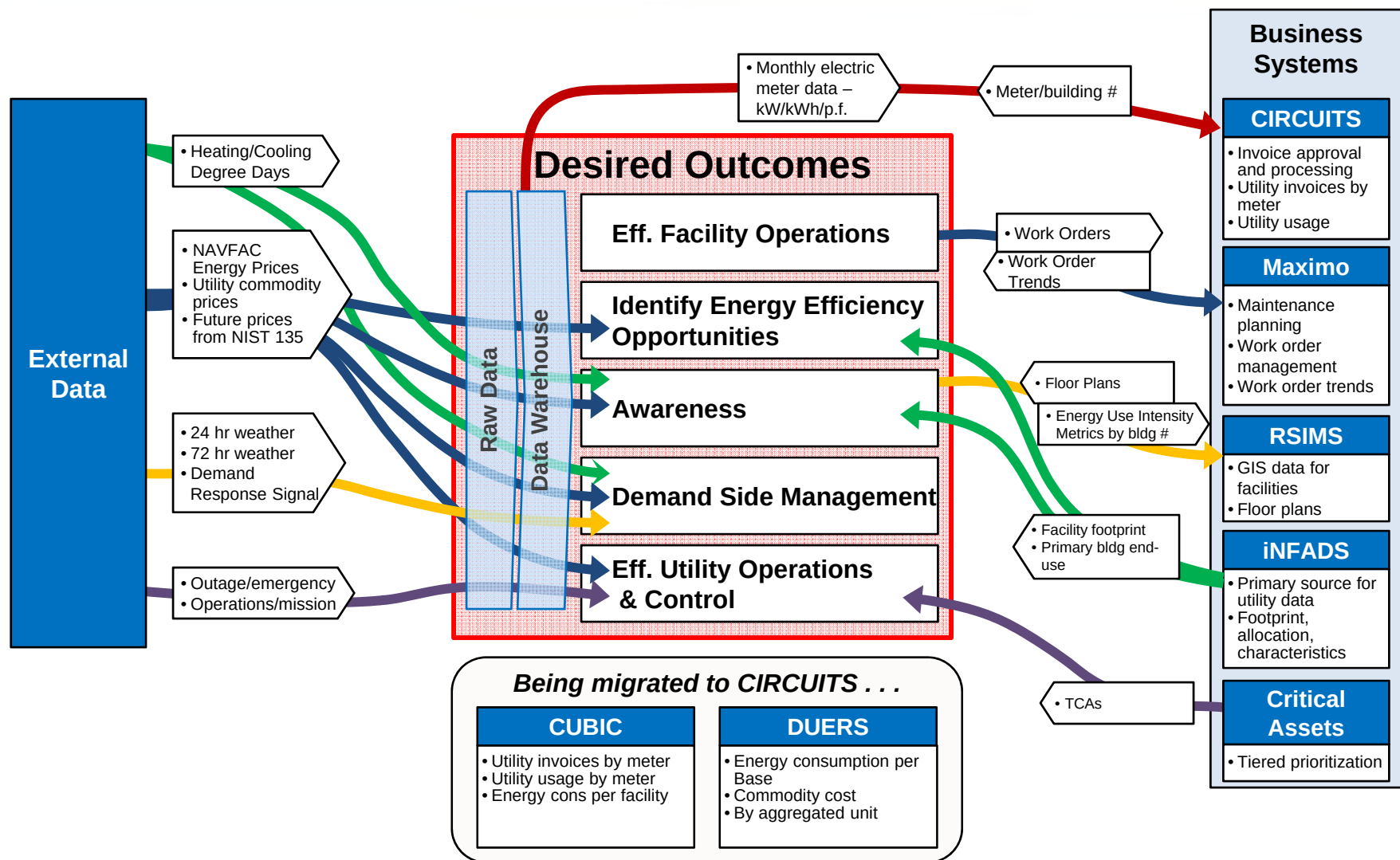


Building Systems



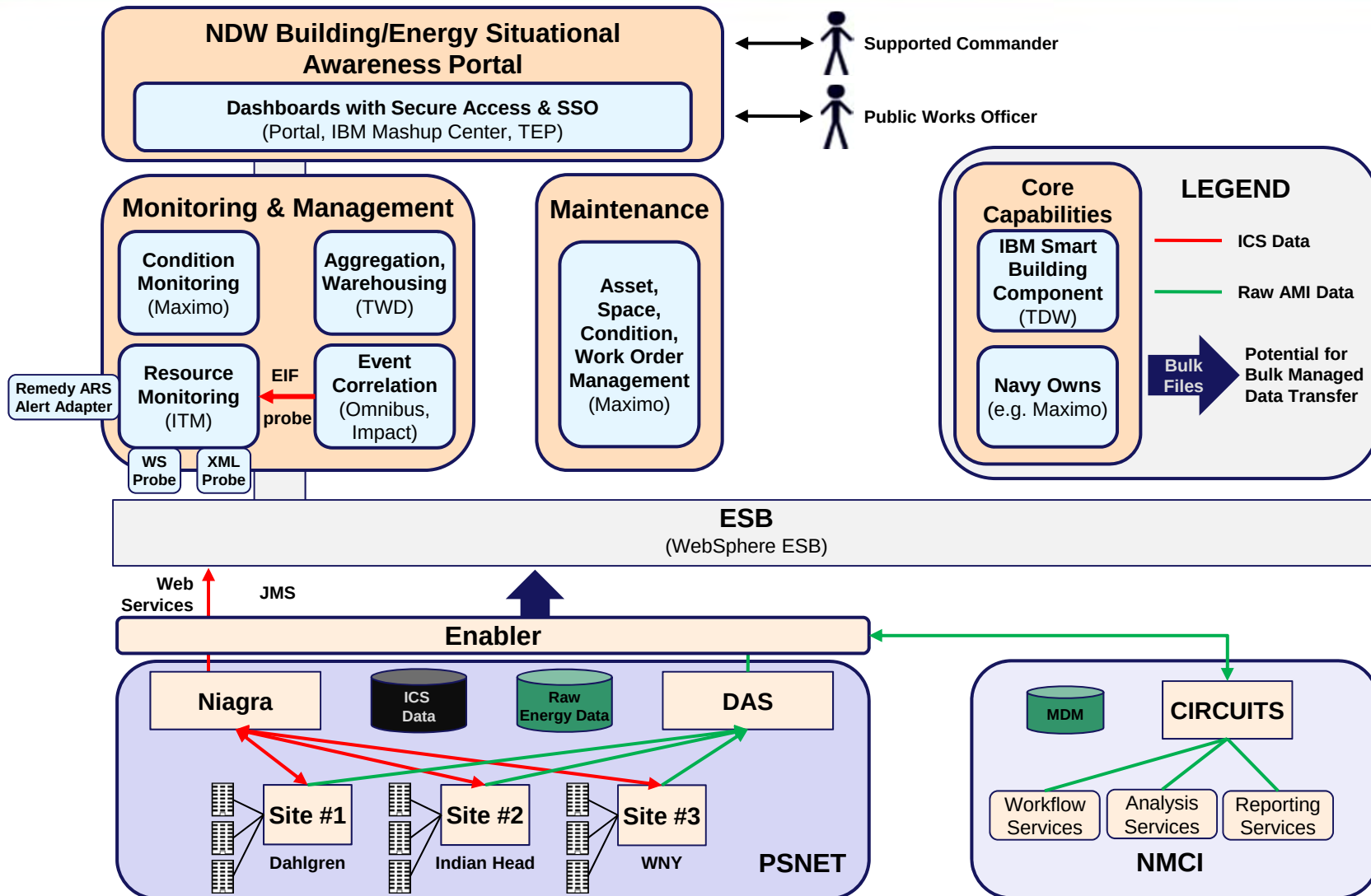


Integration of Smart Energy Management with Business Systems



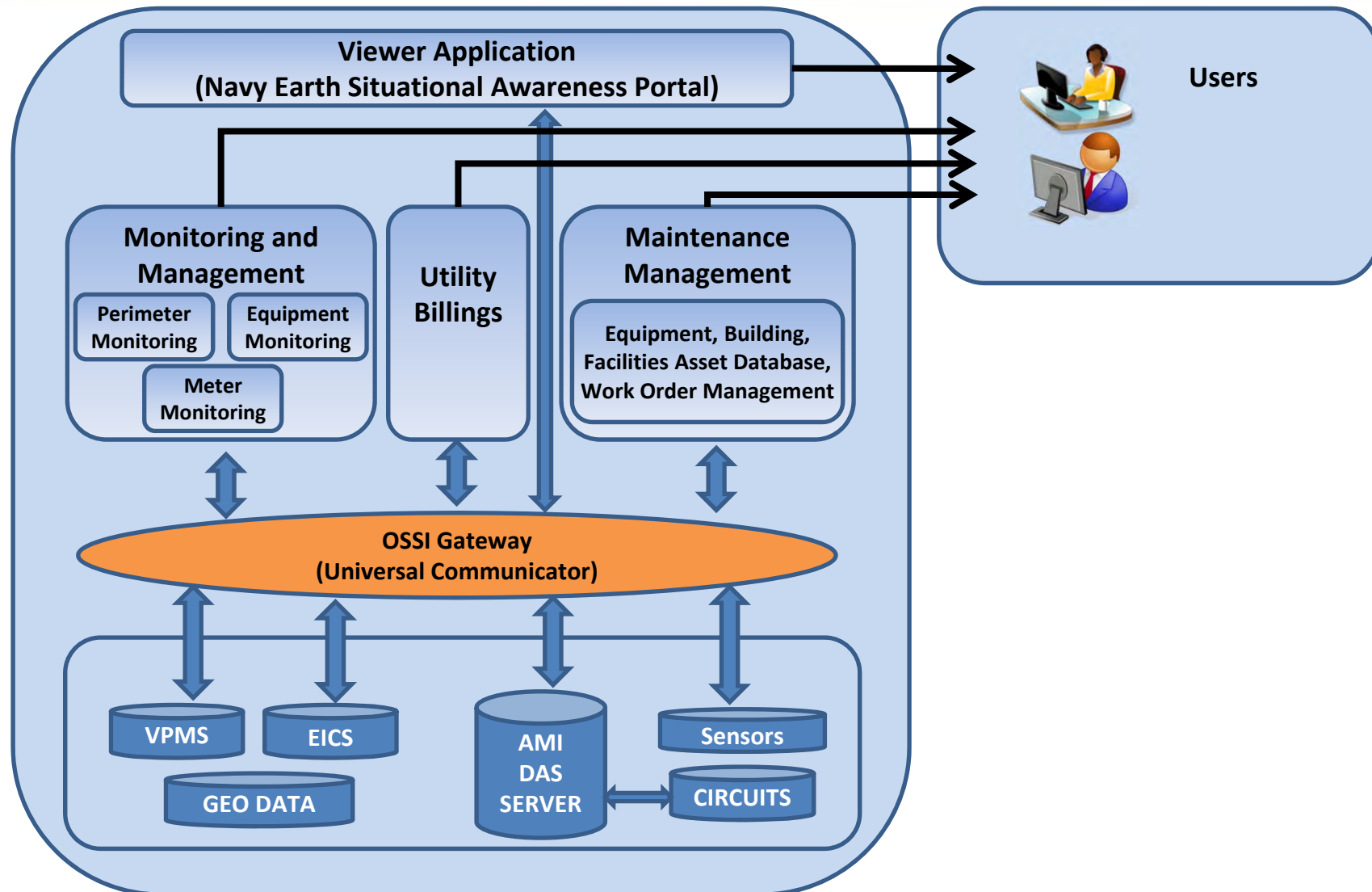


IBM Pilot Architecture



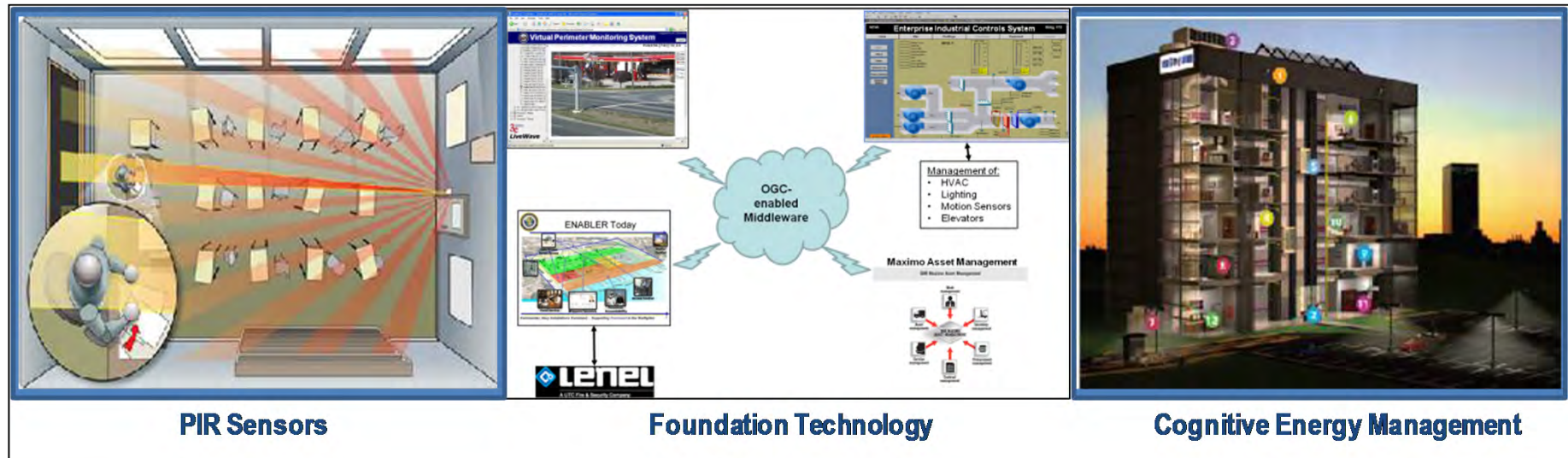


OSSI Pilot Project: System Architecture





Cognitive Energy Management System (CEMS)



NDW CEMS key elements include PIR Sensors, Video, Access Control, Asset Management, EICS Control, and Cognitive Energy Management

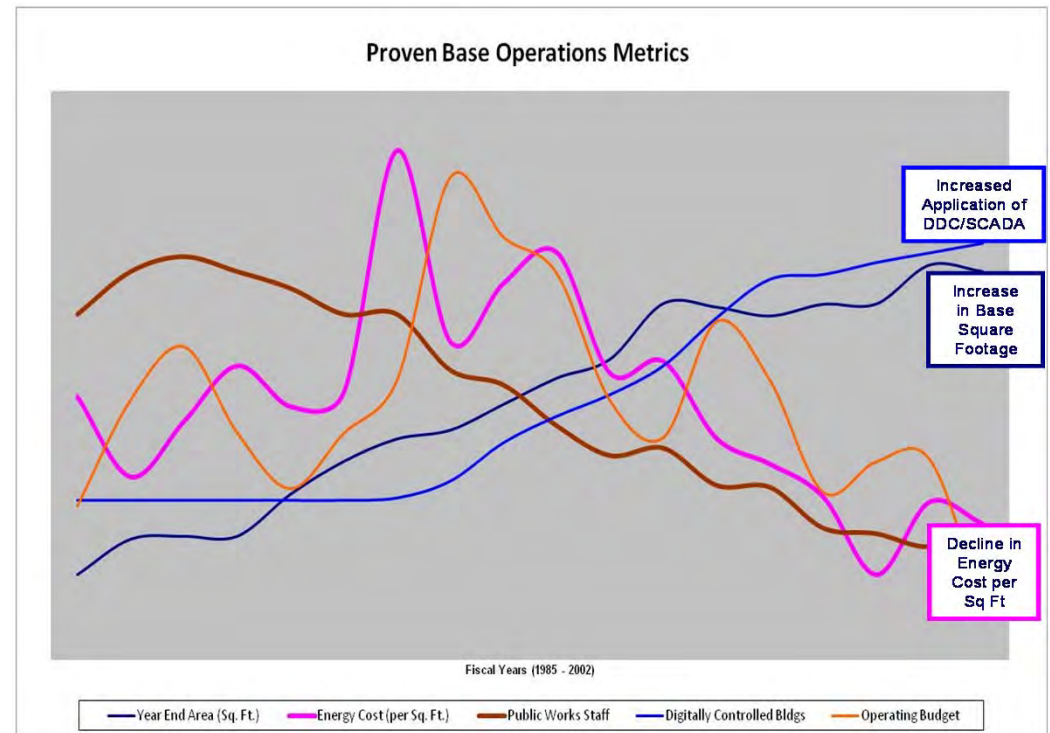
- **Augment standard building automation systems with intelligent control through localized sensors and a person's planned destination based on occupancy**
 - Distributed sensors – VPMS, Lenel, AMI, PIR, & Motion Sensors
 - Controllable integrated building systems – EICS, lighting controls, lighting occupancy sensors, automated building system services
 - Asset Management Systems – MAXIMO, GIS, etc.



CEMS Technical Risks and Objectives



- **Low Technical Risk**
 - CEMS leverages existing systems with prior Navy validation
 - Proven energy consumption reduction metrics
 - Underlying systems have IA accreditation
- **Demonstration Assumptions**
 - Ability to collect adequate off-hour occupancy data for data analysis
 - Ability to install CEMS equipment in selected locations
 - Ability to integrate building control systems with CEMS
- **CEMS is Expected to further NDW's CONOPS Goals of Energy Reduction by demonstrating and piloting additional sensor integration that can be cost effectively implemented in Government Buildings**





NDW SMARTGRID VIDEO

