



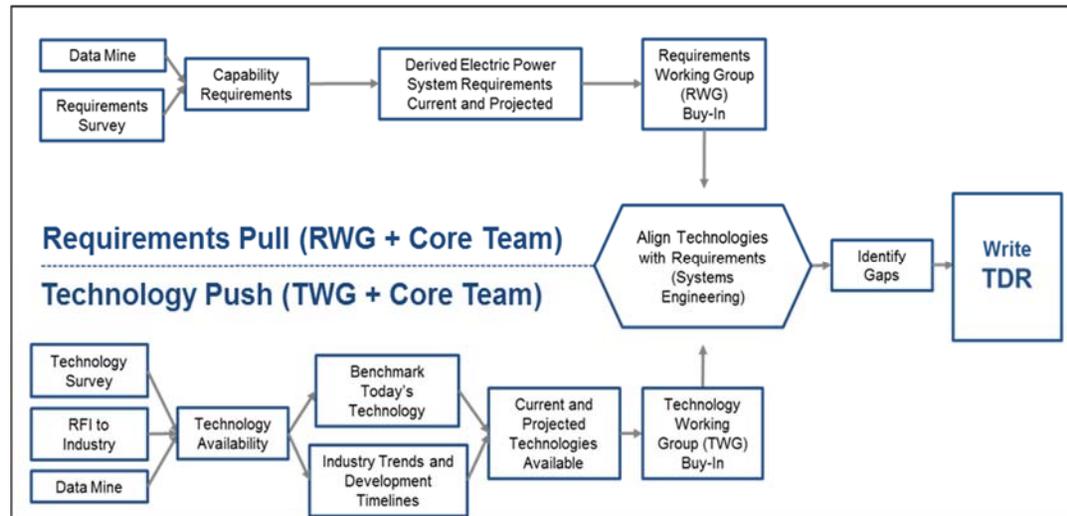
Sea, Air, and Space

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Naval Power and Energy Systems Technology Development Roadmap (NPES TDR)



Product Areas

Controls
Distribution
Energy Storage
Generators
Motors
Prime Movers
Power Converters

Metrics

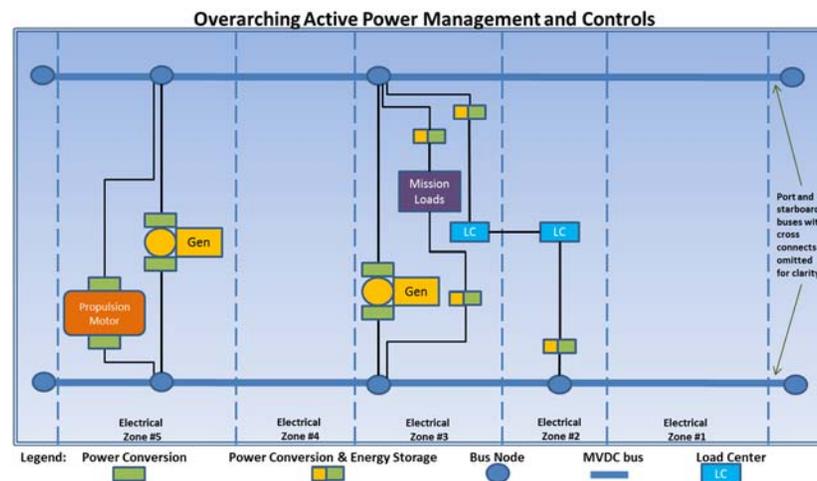
Efficiency
Power Density
Operating range
Cooling Requirements
Current Capacity
Cost
Operating temperature
Maintenance
Fault management
System response
System Reconfiguration



<http://www.navsea.navy.mil/Resources/NPESTechDevelopmentRoadmap.aspx>

Purposes of the Proposed IPES MVDC Advanced Development Model (ADM)

- ◆ Developing and validating IPES and component interfaces and specifications
- ◆ Testing and maturing control system Active Power Management and Cybersecurity
- ◆ Derisking integration of modular energy storage at the main distribution and/or zonal levels
- ◆ Developing and validating interfaces with Combat Systems
- ◆ Informing IPES and ship CONOPS capabilities and limitations



IPES MVDC ADM Reduces Risk through System Demonstration

IPES ADM Planning is Currently Underway



- ◆ **Initial on-hand hardware assessment completed for use ADM**
- ◆ **Developing supporting M&S and power hardware in the loop test capabilities**
- ◆ **Functional / Component Deep Dives in progress**
- ◆ **Developing 25 MW GTG Functional Requirements to meet emerging requirements**
 - Variable Speed to optimize efficiency and performance
 - Split Windings to feed both port and starboard busses
 - Independent rectifiers convert AC -> DC
 - Sized to fit a surface ship < 10,000 tons

Industry Day being planned for 3 August 2016 - NSWCPD

- ◆ **Combat Power and Energy Systems progress**
- ◆ **Integrated Power and Energy Systems Advanced Development Model Planning**
- ◆ **25MW (Nominal) 12 kVDC Gas Turbine Generator (GTG)**
- ◆ **Will include visit to NSWC test site to observe existing infrastructure**
- ◆ **Announcement posted today (16 May), N00024-16-R-4208**

“Information Meeting on the Development of Future Ship Power Systems”

- ◆ **RFI for 20–30 MW GTG released on 6 January 2016**
 - **N00024-16-R-4025**
 - **One-on-one meetings to be planned for early June**

Accepting GTG RFI Responses through 30 June 2016