



# PMS 320 Electric Ships Office

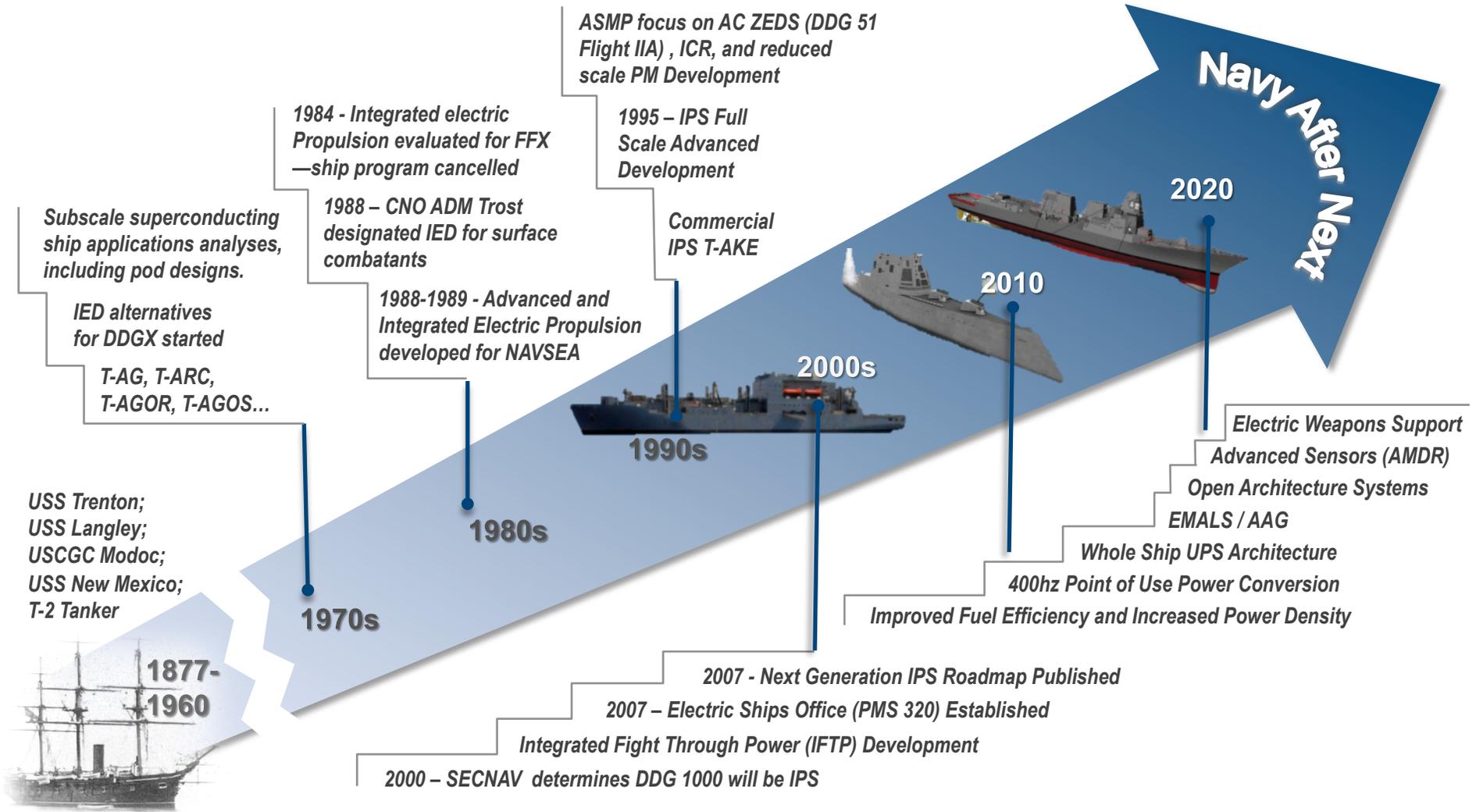
Surface Navy Association  
January 12, 2012

**Dr. Timothy J. McCoy, PE**  
**Director PMS 320**



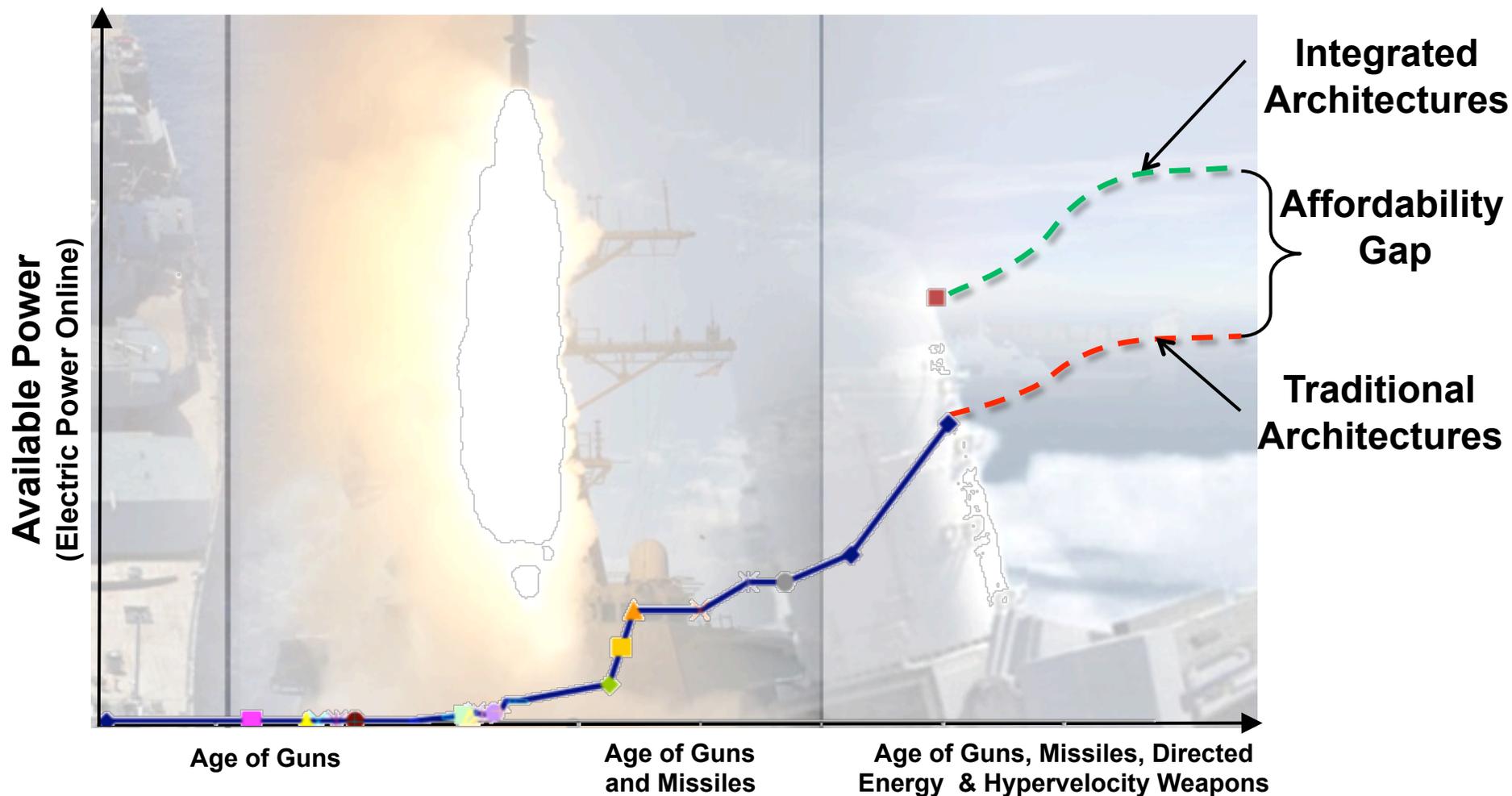
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# US Navy Electric Ships History



## A History of Successful Development and Transition

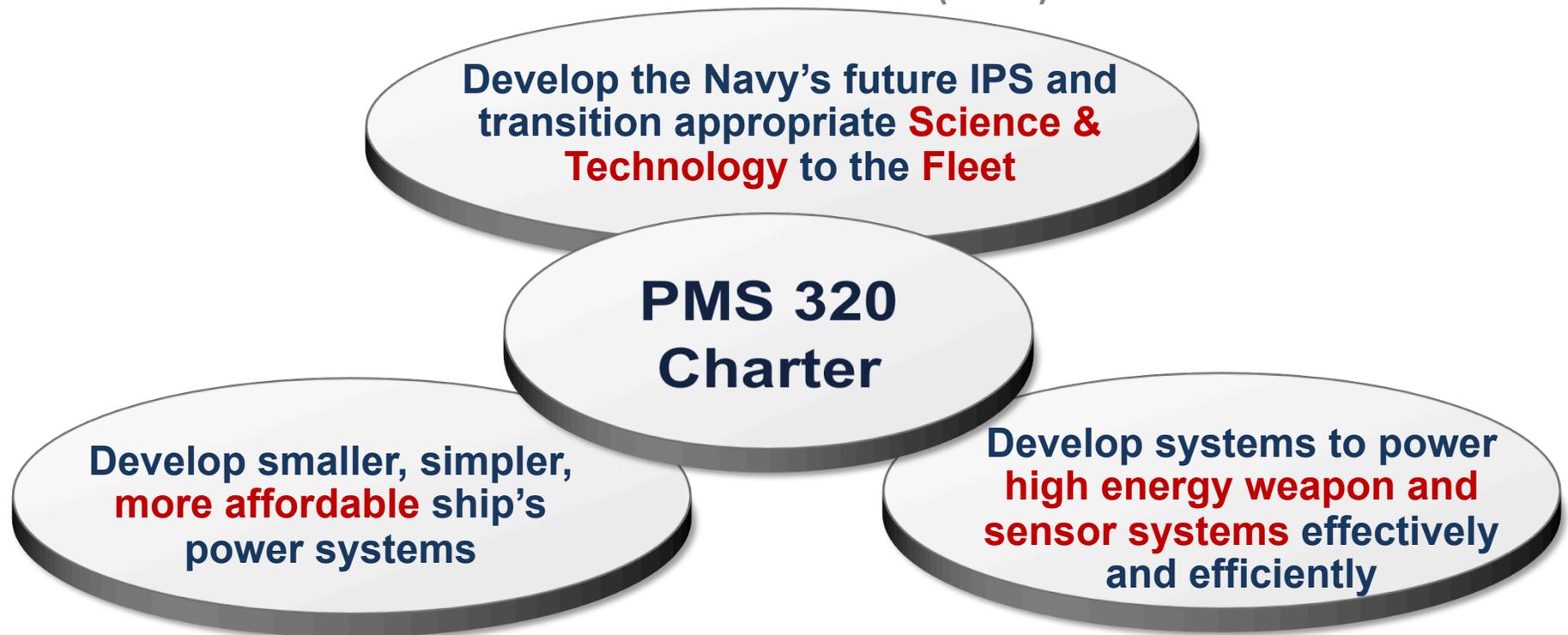
# Warfighting Needs Drive Power Systems



*Increased demands for power will continue for the foreseeable future*

The Electric Ships Office is responsible for...  
“developing and executing an integrated power systems  
(IPS) technology development and transition plan.”

- ASN (RD&A) Memorandum 13 NOV 07



...transitioning Technology to deliver more power and more affordability

# Technology Transition



**Industry**



**Academia**

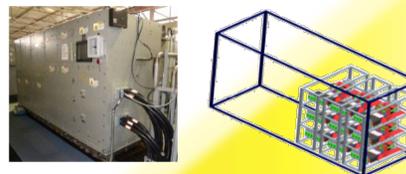


**Warfare Centers**

- Silicon Carbide
- High Temperature Superconductors
- Energy Recovery
- Advanced Thermal Management
- Synthetic Hydrocarbons & Alternative Fuels
- Bio-Energy Conversion
- Advanced Battery Technology
- Fuel Efficient Turbine
- Compact Power Controls
- Highly Distributed Agent Based Controls
- 400 hz Point-of-use Power Conversion
- Electric Auxiliaries



**AMDR PCM**



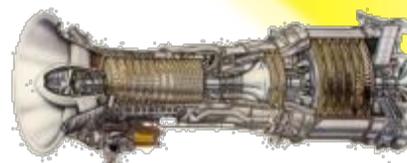
**HED**



**ESM**



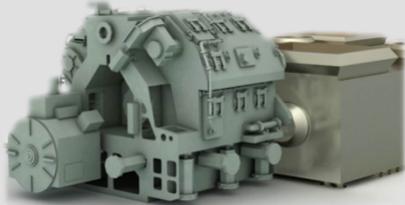
**Advanced Generator Sets**



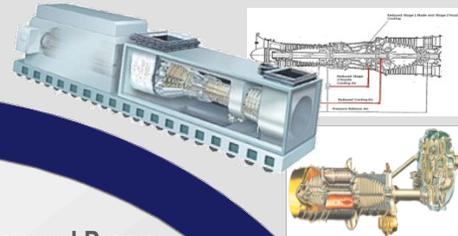
*Transitioning Technology to Affordably Reconfigure the Force in Stride*

# PMS 320 Maturing and Transitioning Affordable Power and Energy Solutions

- Reduce DDG 51 Class in-service fuel consumption
- Provides propulsion at low ship speeds without the need for LM 2500 main engines
- Assure mobility, lighten the load, expand tactical reach, and green our footprint



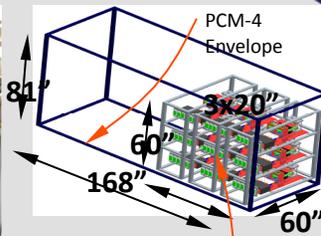
- Provide fuel efficient and affordable power to meet power requirements for advanced sensors and future weapons



- Reduction in weight and lower life cycle costs
- Up to 14% reduction in fuel consumption over the DDG 51 FLT IIa GTG



- Power conversion from ship current to 1000 VDC for the AMDR
- Potential for faster switching frequencies and higher temp. operation
- Smaller footprint



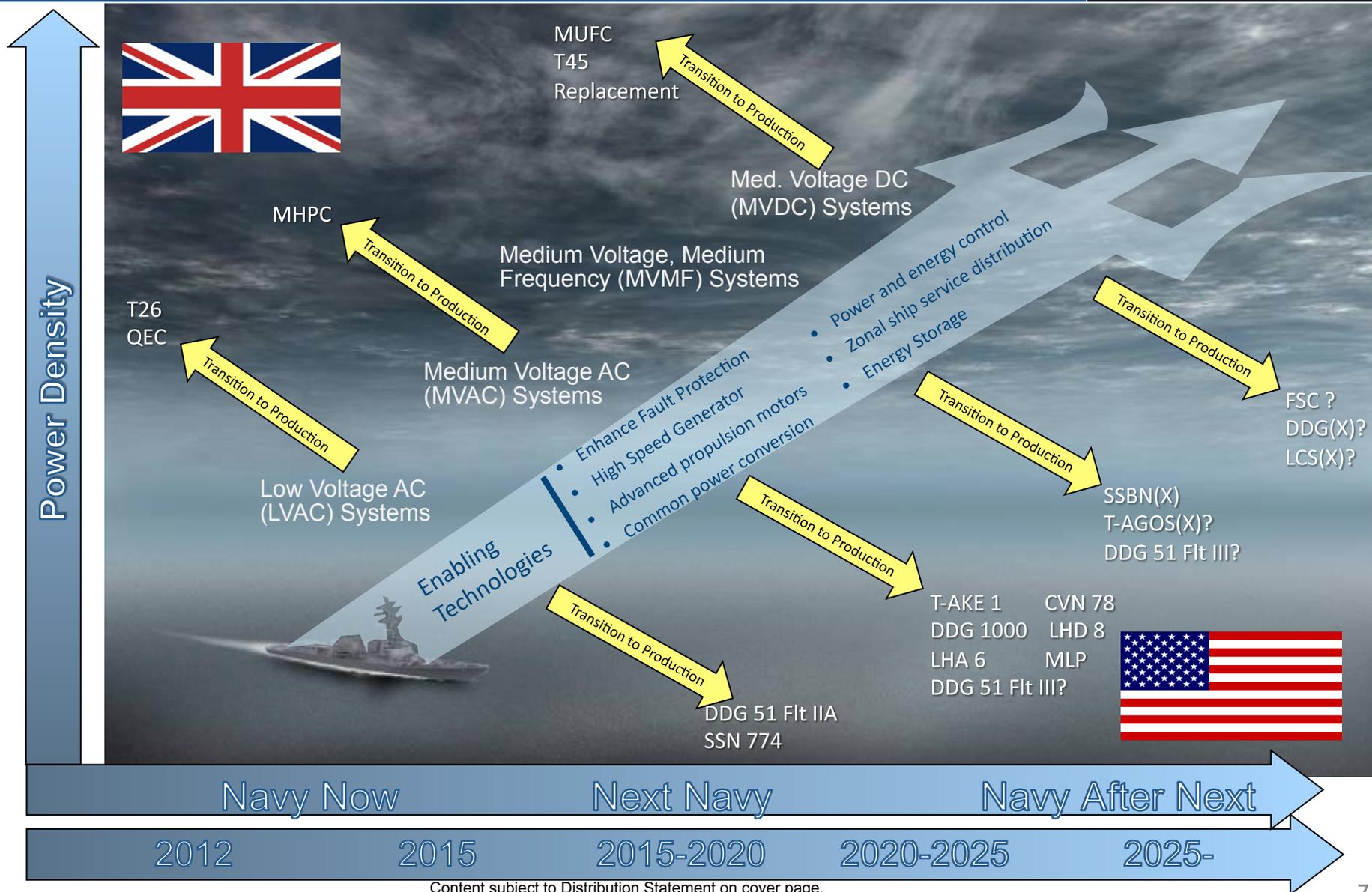
- Ship Service electrical power from propulsion system through reduction gear

Content subject to Distribution Statement on cover page.



- De-risking Single Generator Operations
- High efficiency GTGs used with no electrical system degradation
- Support pulsed power requirements of advanced weapons

# Advanced Electric Power & Propulsion Project (AEP<sup>3</sup>)





**Questions?**

- **BACKUP Slides**

# DDG 51 Hybrid Electric Drive (HED) Electric Propulsion for Backfit Fuel Efficiency

## Capability Required

- Reduce DDG 51 Class in-service fuel consumption

## Technology Description

- Provides propulsion at low ship speeds without the need for LM 2500 main engines. Fuel savings from the Hybrid Electric Drive system will be achieved by utilizing fewer gas turbines.

## Technology Benefits

- Provides critical foundation for SECNAV and CNO objectives to achieve greater Navy-wide energy security. Aligns with the following energy security strategic imperatives: assure mobility, lighten the load, expand tactical reach, and green our footprint.

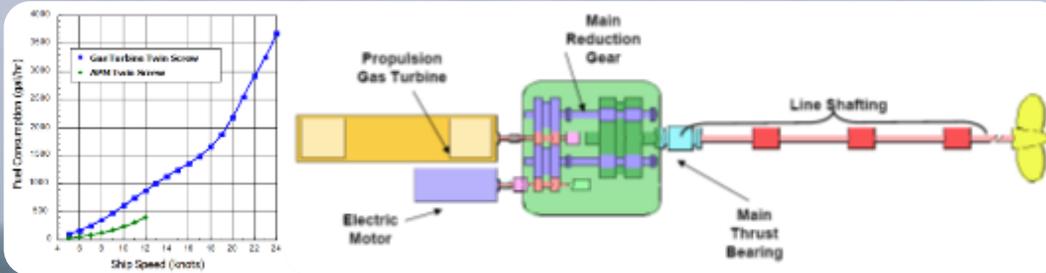


*Leveraging Common DDG 1000 Power Electronics and LHD8 for Proof of Concept*

# USS MAKIN ISLAND (LHD 8)

## Hybrid Electric Drive technology in the Fleet

Electric Ships Office  
PMB  
**320**  
Directing the Future of Ships Power



- ◆ Reduces time gas turbine spends at low power levels
- ◆ Estimated annual fuel savings over \$500,000; life cycle fuel savings over \$21,000,000
- ◆ Additional savings resulting from reduced maintenance and lower manning

**2 x 5,000 BHP motors can drive ship at 12+ knots**