



# **BMT: Driving Operational Advantage in a Net Zero Future**

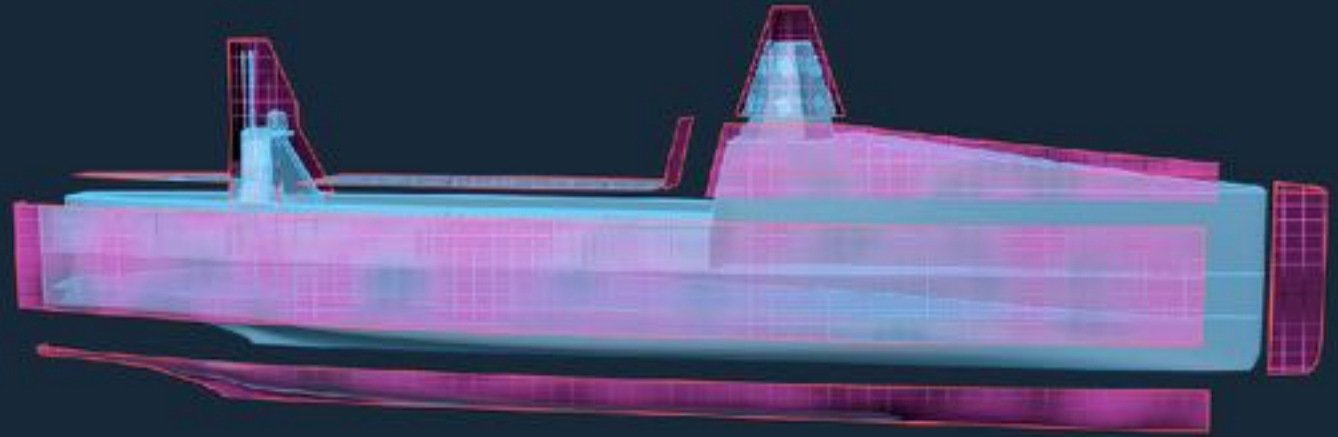
**Combined Naval Event  
Farnborough 2024**

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# About BMT



**Maritime Design  
and Consultancy**



**Asset Monitoring  
and Sustainment**



**Environment and  
Climate Solutions**



**Defence and  
Security Acquisition  
& Customer Friend**

# Design Pedigree



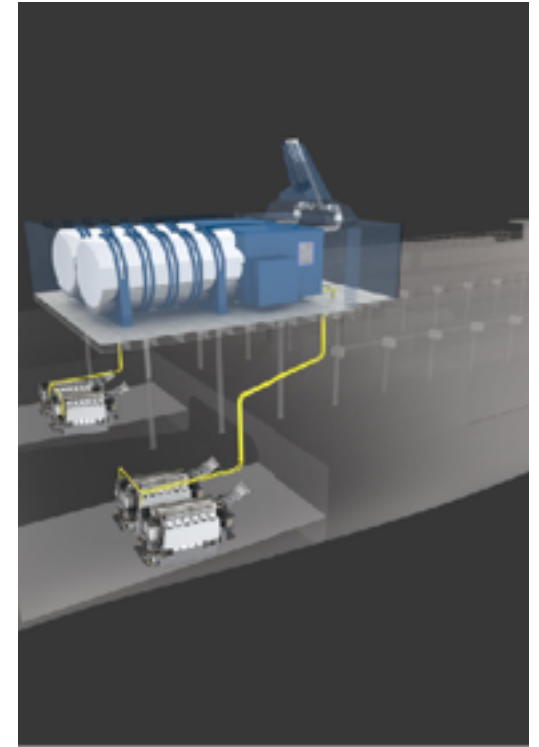
**Fleet Solid Support Ship**



**Concept Design for Queen Elizabeth Class**



**Hybrid Crew Transfer Vessels**



**Future Fuelled Ferry Designs**

# Innovation



**Synthetic  
Environment  
Assurance System**



**SPARO**



**Large Uncrewed  
Surface Vessel**



**Academic  
Engagement**

# The Naval Energy Transition

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- There are some key requirements to be accounted for when considering the energy transition for Naval vessels.
- Current Naval Fleets will be operating out to 2040s, with In-Build/In-Design out to 2060s & 2070s.
- NATO Doctrine still centers on a single Fuel policy, for power & propulsion, and for aviation.

Yet

- Pressure to reach Net Zero by 2050 is ever increasing
- No common future fuel has emerged as a front runner in Commercial



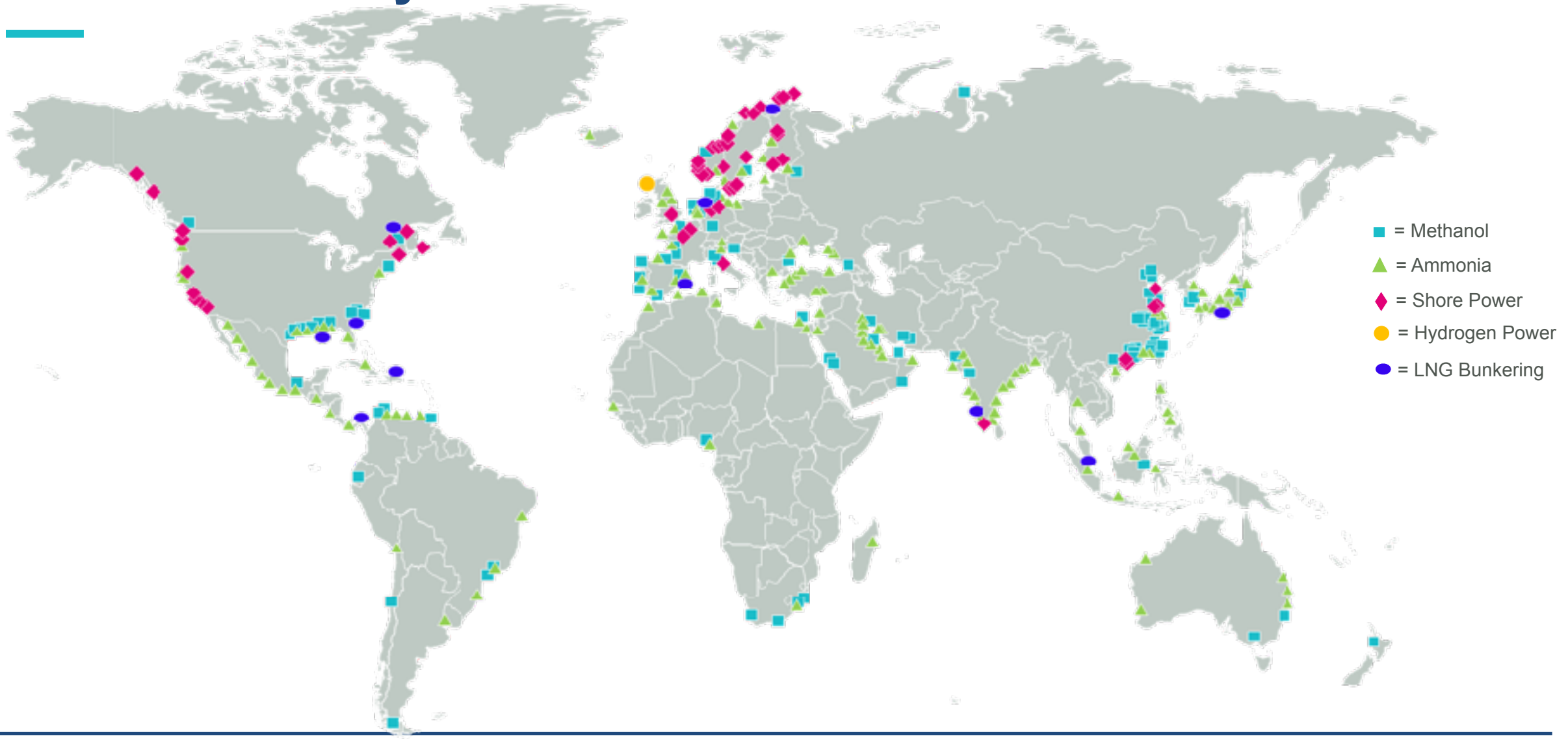
# Key Requirements

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- Asset Capability/Availability
  - Global operations (War & Peace)
  - Forward deployment
- Survivability
  - Fuel volatility & vulnerability
- Fuel Security/Availability
  - Global operations
- Sustainability
  - Requirement for Net Zero
- Interoperability
  - Key for NATO & Allies

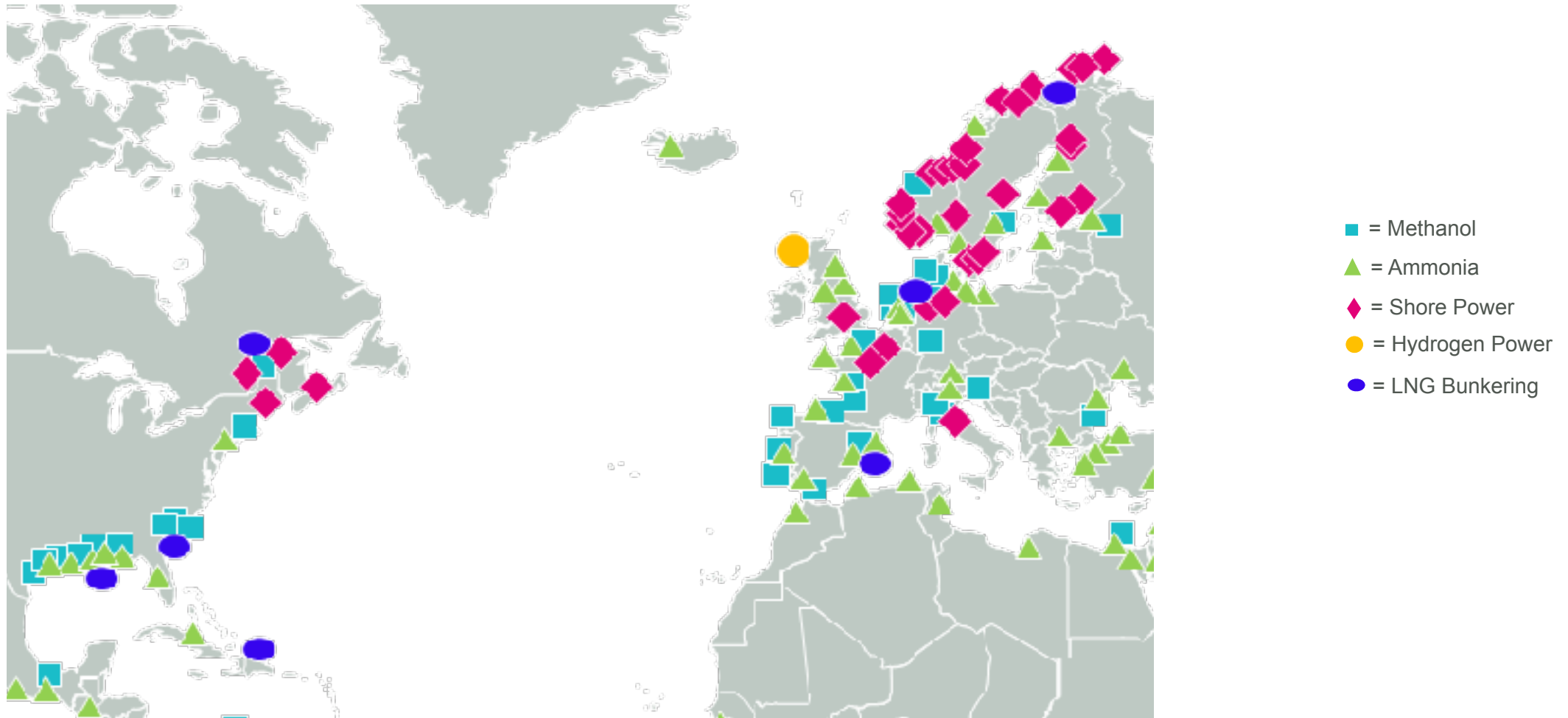


# Fuel Availability





# Fuel Availability



# Fuel Production Ownership

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- Taking ownership of fuel production minimises the risks associated with fuel security and potentially interoperability.
- Depending on the chosen fuel it could remove risks surrounding vessel diversity as well as survivability.
- BUT ...
- What about fuel availability?

FNPSs offer a stop gap solution until utopian solution(s) emerges

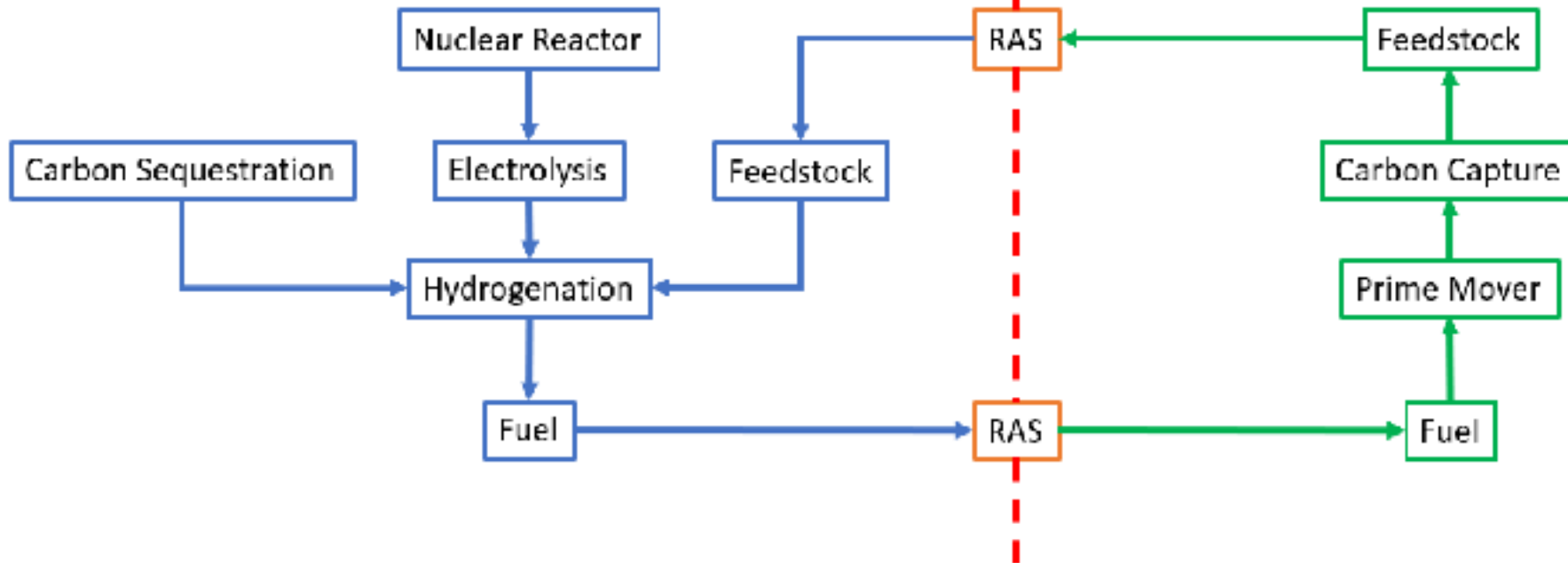
# What is a FNPS?

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- A nuclear powered vessel that produces fuel at sea.
- Fuel production can be tailored for the fuel of choice.
- Operating as part of a flotilla or a stand-alone vessel.
- Replacing or supplementary to existing oilers.
- A potential Net-Zero approach to the Naval Energy Transition.



# Overarching Concept





# How would FNPS work?


- Operating as part of a flotilla for Carrier & Littoral Strike.
- Support humanitarian aid efforts
- Possible joint venture between NATO/Allied Nations.
- Allows existing vessels to operate as per current requirements.
- Sustained presence as only limited by solids





# How would FNPS work?





  **United Kingdom  
Carrier Strike Group**


  
HMS QUEEN ELIZABETH


  
HMS DIAMOND


  
HMS DEFENDER


  
HMS KENT


  
HMS RICHMOND


  
RFA TIDESPRING


  
RFA FORT VICTORIA


  
USS THE SULLIVANS


  
HNLMS EVERTSEN


  
42 CDO RM

  
815 NAS

  
845 NAS

  
820 NAS

  
617 SQN

  
VMFA-211

# How do we get to FNPSs by 2040?

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- Complex Project?
  - Nuclear Power Plant
  - Fuel Production / Refinement Plant
  - Commercial design, low Navalisation
  - Minor evolution of Naval Doctrine
- How to assess feasibility of 2040 ISD?

**DLODs +**

# Defence Lines of Development

Recently expanded set of 16 considerations when defining and procuring major Defence Capabilities

DL0D+ Element	Current Readiness Level	Future Readiness Level c2040
Training	6	8
Equipment	4	8
Personnel	6	9
Information	4	9
Doctrine & Concepts	4	9
Organisation	5	8
Infrastructure	3	7
Logistics	8	9
Integration	3	7
Safety	6	8
Climate Change & Sustainability	7	8
Capability Protection/Security	7	8
Regulations & Certification	4	8
Test & Evaluation	3	7
Commercial	3	6
Finance	2	5



# Conclusions

- The naval energy transition has many components that need to align.
- Sustainable fuel that is global is a necessity.
- Use of FNPS can mitigate the risks associated with the energy transition.
- Provides fuel availability & interoperability; could increase freedom to manoeuvre & operational reach.
- DLODs+ Review highlights only a few challenges to a 2040 In Service Date for a NATO/EU operated Floating Nuclear Production Ship

Government's  
& Navies  
need to make  
investment  
decisions  
soon

**Thank you for listening**

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**Any questions or queries please visit BMT at  
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