



Tactical Marine Solutions Ltd.



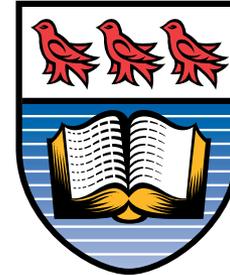
A Marine Management Company

www.tactmarine.com



Tsekoa II

- Original Tsekoa II
- Conversion description
- Green technologies



**University
of Victoria**





Tsekoa II





Conversion

- New mid-body section
- ROV operations
- Acoustics
- Dry lab and containerized wet lab
- Deck machinery
- Regulatory updates



Tsekoa III



BMT



Green Technologies

- Hydrogen PEM fuel cell
- Lithium ion battery bank
- Optimized diesel electric power plant
- Non-Biocidal hull coating system



Fuel Cell

- What is a fuel cell ?
- Why a fuel cell ?

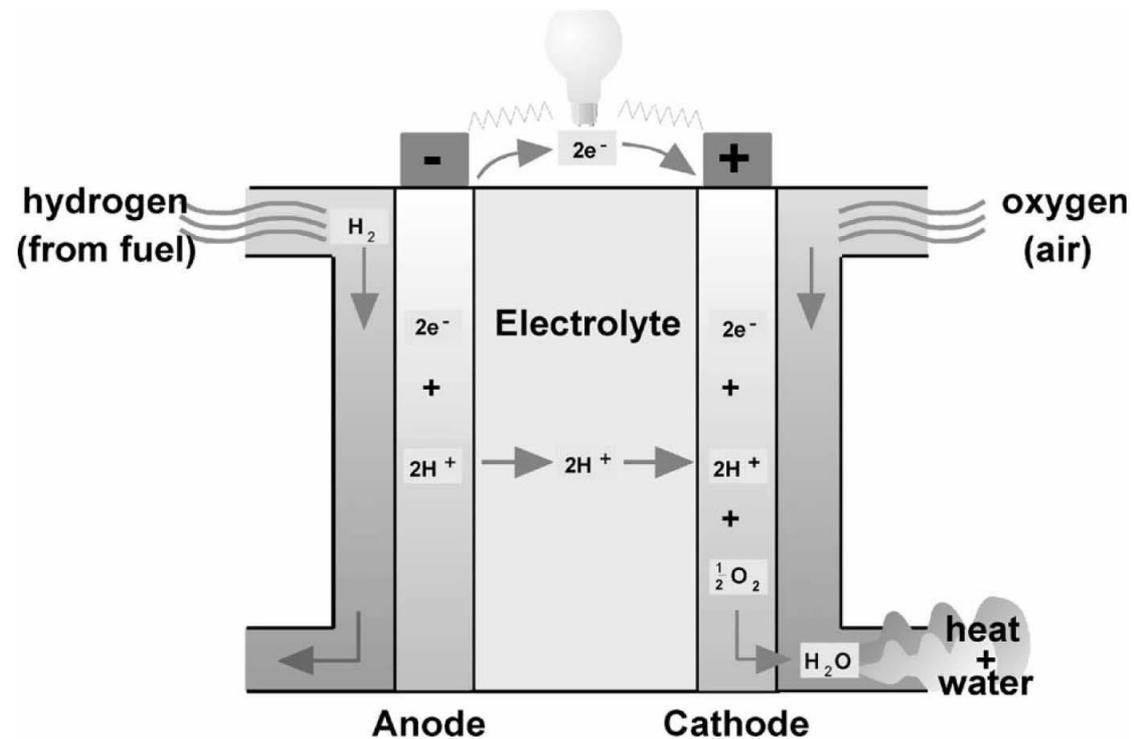
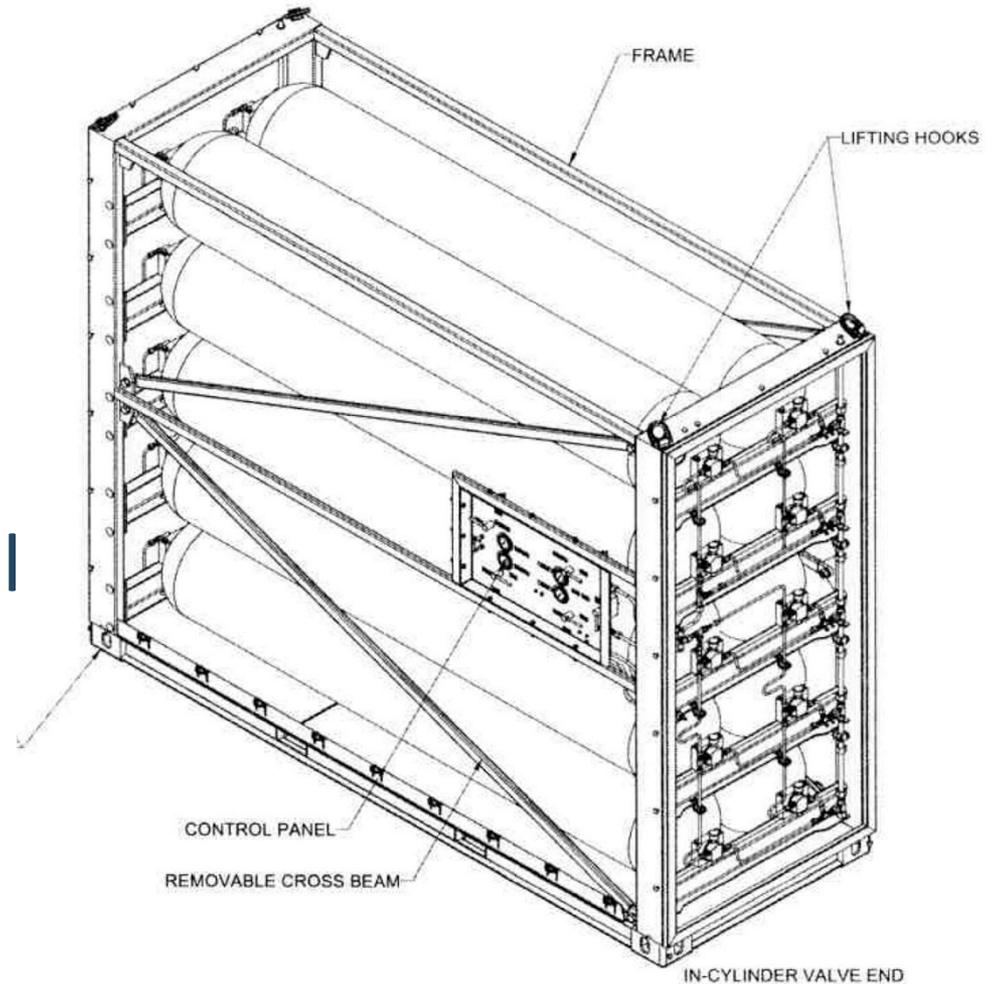


Fig. 2. Schematic of a PEM fuel cell operation. Source: World Fuel Cell Council.



Fuel Cell Challenges

- Supply
- Hydrogen fuel storage
- Safety
- Regulatory Approval
- Integration





Battery Bank

- Different chemistries available

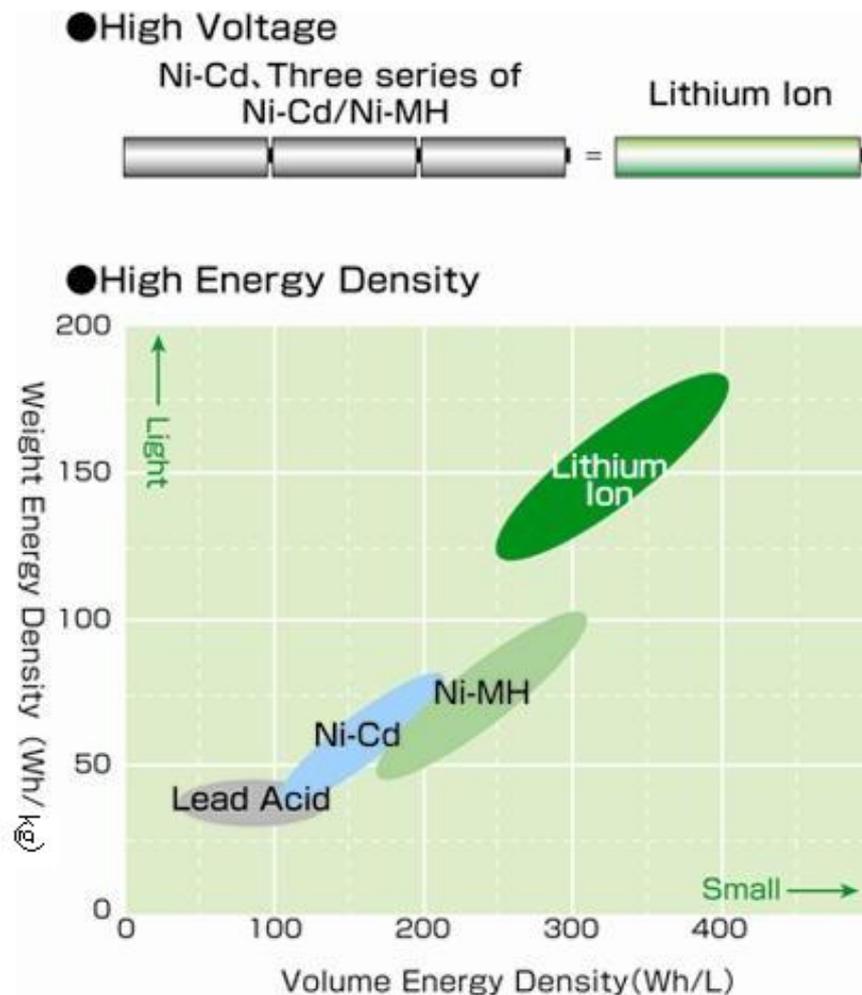
Chemistry	Energy Density Wh/Kg	Advantages	Disadvantages
Lithium Nickel Cobalt Aluminum (NCA)	170	Most Proven High Energy Density High Power	Safety Cost (Cobalt and Nickel) Life expectancy Range of charge
Lithium Manganese Spinel (LMO/LTO)	150	Cost	Life expectancy Safety Low Temperature Perform.
Lithium Titanate (LTO)	150	Safety Life expectancy Discharge time Range of charge	Cost vs. LMO Energy density
Lithium Iron Phosphate (LFP)	140	Safety Life expectancy Range of charge Cost	Low Temperatures Perform.

Adapted from: Global Market Research, Deutsche Bank, June 2008.



Battery Selection

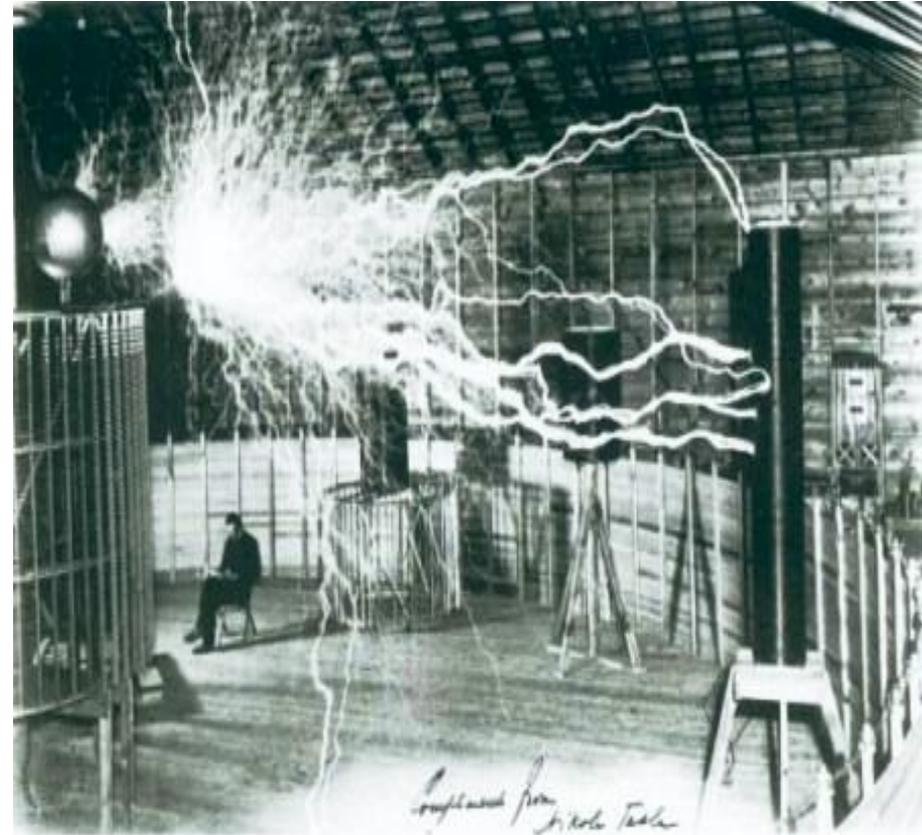
- Develop load profile
- Determine constraints





Power Management

- Operating modes
 - Battery
 - Battery & Fuel Cell
 - Battery & Diesel
 - Shore Power
- Optimization





Non-Biocidal Hull Coating

- Vinyl ester resin
- Applied at 1000 microns
- Not an antifouling paint





Non-Biocidal Hull Coating



- Approved for in water cleaning
- Substantial fuel savings
- Extended docking intervals
- Shorter dry dock time



Additional Green Features

- Heat recovery system from HVAC system
- Installation of high efficiency lighting
- Use of high efficiency motors



Why Do All This

- Develop new control systems
- Optimize power management systems
- Stepping stone to a commercially viable ship
- Test bed vessel for a variety of different power sources



Contact Us

Tactical Marine Solutions Ltd.
2103E – 4464 Markham St
Victoria, B.C. V8Z 7X8 Canada

Phone: +1 (250) 388-7882
+61 (2) 8014-7216

Fax: +1 (604) 909-4675

Email: info@tactmarine.com

Website: www.tactmarine.com

TACTICAL MARINE SOLUTIONS LTD.

