Tactical Marine Solutions Ltd.

A Marine Management Company

www.tactmarine.com
Tsekooa II

- Original Tsekooa 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
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
### Different chemistries available

<table>
<thead>
<tr>
<th>Chemistry</th>
<th>Energy Density</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lithium Manganese Spinel (LMO/LTO)</td>
<td>150</td>
<td>Cost</td>
<td></td>
</tr>
<tr>
<td>Lithium Titanate (LTO)</td>
<td>150</td>
<td>Safety, Life expectancy, Discharge time, Range of charge</td>
<td>Cost vs. LMO, Energy density</td>
</tr>
<tr>
<td>Lithium Iron Phosphate (LFP)</td>
<td>140</td>
<td>Safety, Life expectancy, Range of charge</td>
<td>Low Temperatures Perform.</td>
</tr>
</tbody>
</table>

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**

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