Performance of Energy Storage Mediums

- Thermite, Metals
- Fossil fuels, heavy hydrocarbons
- Biologicals, alcohols
- Methane
- Hydrogen
- Batteries

Goal!
WSU and Hydrogen Vehicles: Circa 2012
Liquid Hydrogen Fueled UAS

- Funded $20,000 on June 30th 2012
- Mission From Dean: Be the first university team to design, build, and fly an LH$_2$ fueled UAV.
Design - Build - Test
### Flight Statistics

<table>
<thead>
<tr>
<th>Flight</th>
<th>Date</th>
<th>Duration</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flight 1</td>
<td>5/18/2013</td>
<td>16 min</td>
<td>First Flight</td>
</tr>
<tr>
<td>Flight 2</td>
<td>5/31/2013</td>
<td>18 min</td>
<td>First Autonomous Operation</td>
</tr>
<tr>
<td>Flight 3</td>
<td>6/15/2013</td>
<td>32 s</td>
<td>ESC Failure, Ditch</td>
</tr>
<tr>
<td>Flight 4</td>
<td>8/10/2013</td>
<td>3.5 min</td>
<td>Dead stick Landing</td>
</tr>
<tr>
<td>Flight 5</td>
<td>9/28/2013</td>
<td>22 min</td>
<td>Cold and wet</td>
</tr>
<tr>
<td>Flights 6&amp;7</td>
<td>10/5/2013</td>
<td>46 min</td>
<td>Great Success</td>
</tr>
</tbody>
</table>
- Cryogenic Type IV Hydrogen Fuel Tank for **ScanEagle**

Liquid hydrogen production + Patent pending storage system + PEM fuel cell powerplant = New capabilities and markets
Fun with Cryogenics!

Hydrogen Properties for Energy Research
Designing a Drop-in Hydrogen Fueling Station
2014 Hydrogen Student Design Contest
Long Beach, CA
May 8, 2014

In this presentation...
1. Project Scope
2. Customer Attributes
3. Liquid H₂ Delivery
4. Station Design
5. User Interface
6. Safety Features
7. Site Logistics
8. Economic Analysis

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Mikko McFeely
Simon Guo
Ben Smith

Jake Fisher
Breanna Bence
Sayonsom Chanda
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Brian Beleau
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Austin Miller
Dr. Liv Haselbach