The Future for Transport to Canada’s North: Airships and Other Options

Dr. Barry Prentice
Professor, I.H. Asper School of Business, University of Manitoba
President, ISO Peter

Transportation in Northern Canada

Challenges
- Infrastructure Gaps
  - Vast Distances
  - Seasonal Service
- High Freight Rates
  - Thin Markets
  - Few Backhauls
- Harsh Conditions
  - Constant Climate Change
  - Permafrost

Current Solutions
- Ships
- Barges
- Trucks
- Airplanes
- Helicopters

Potential Solution
- Airships

Climate Change, Northern Sovereignty and Oil Spills

Marine Transport in Northern Canada

Permafrost Zones in Canada

Western Arctic
Approximate northern limit of connecting all-weather roads and rail lines

Eastern Arctic
**Ice Roads in Northern Canada**

**Manitoba All-weather Gravel Road Initiative**

ESRA Statistics:
- Approximate road length – 872 km
- Approximate cost - $2.7 billion (2010$)
- Approximate cost per km - $ 3 million
- Commitment - $315 million over 15 years
- Current population served – 16,513
- Approximate cost per person - $163,000

Source: East Side Road Initiative, Vol. 3 Summer 2011

**Aircraft Cost Comparison for a 300 km Flight**

<table>
<thead>
<tr>
<th>Aircraft Type</th>
<th>Cargo (kg)</th>
<th>Cost ($/km)</th>
<th>Cost ($/kg)</th>
<th>Airstrip (m)</th>
<th>Rates ($/T-km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Twin Otter</td>
<td>965</td>
<td>$6.50</td>
<td>$4.09</td>
<td>310</td>
<td>$13.63</td>
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<tr>
<td>DC3</td>
<td>2500</td>
<td>$10.60</td>
<td>$2.46</td>
<td>925</td>
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<tr>
<td>Curtis C-46</td>
<td>6600</td>
<td>$17.95</td>
<td>$1.58</td>
<td>1075</td>
<td>$5.27</td>
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<td>DHC Buffalo</td>
<td>7500</td>
<td>$17.00</td>
<td>$4.57</td>
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<tr>
<td>Hercules</td>
<td>20000</td>
<td>$28.50</td>
<td>$0.86</td>
<td>1700</td>
<td>$4.57</td>
</tr>
</tbody>
</table>

**Freight Rates, Food Prices and Poverty**

- **Winter 2005**
  - Milk 4 Litres: $12.19
  - Tomatoes: $3.80 lb
  - Bananas: $2.31 lb
  - Apples, Macintosh: $2.94 lb
  - Head Lettuce: $2.69 each
  - Bread 60%: $2.49 each
  - Ground Beef: $9.19 Kilo
  - Red Potatoes: $1.60 lb
  - Cheerios: $8.45 box
  - Coke 2 Litres: $7.99
  - Coffee: $11.89 Kilo

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</table>

Total Basket: $65.54 / $27.49
Technological advances have been applied to a new generation of cargo transport airships.

- **Strength:**
  - Robust, lightweight envelope materials
  - Carbon fibre composites
  - All aluminum rigid designs

- **Control:**
  - Vectoring engines
  - Modern avionics/hydraulics
  - Tail and bow thrusters
  - Pressured gas ballasting

- **Safety:**
  - Computer design tools
  - Satellite weather information
  - “Glass” cockpit screens
  - GPS
  - No human contact during ground handling

New airships under development

- LEMV (Hybrid Air Vehicles)
  - 250 ton and 50 ton (Varialifter)
  - Aeroscraft (WorldwideAeros)

- P-791 (Lockheed-Martin)
### Status of Airship Developers

<table>
<thead>
<tr>
<th>Location and Company</th>
<th>Aerosats</th>
<th>LTA Vehicles</th>
<th>Hybrid Vehicles</th>
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</thead>
<tbody>
<tr>
<td>U.S.:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lockheed Martin</td>
<td>TCOM</td>
<td>certified</td>
<td>design/testing</td>
</tr>
<tr>
<td>Worldwide Aerea</td>
<td>certified</td>
<td></td>
<td>prototype</td>
</tr>
<tr>
<td>American Bump Co.</td>
<td></td>
<td></td>
<td>certified</td>
</tr>
<tr>
<td>Ohio Airships</td>
<td></td>
<td></td>
<td>design/testing</td>
</tr>
<tr>
<td>Germany:</td>
<td>CargoLifter KG</td>
<td>testing</td>
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<tr>
<td>Zeppelin</td>
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<td></td>
<td>certified</td>
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<tr>
<td>U.K.:</td>
<td>Varalift Airships</td>
<td>design/testing</td>
<td>prototype</td>
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<tr>
<td>Canada:</td>
<td>BASI</td>
<td></td>
<td>prototype</td>
</tr>
<tr>
<td>Russia:</td>
<td>RosAeroSystems</td>
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<td>certified</td>
</tr>
<tr>
<td>South Korea:</td>
<td>National Research</td>
<td>testing</td>
<td></td>
</tr>
<tr>
<td>China:</td>
<td>Vantage Airship Co.</td>
<td>certified</td>
<td></td>
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### Obstacles to Commercialization

- Absence of Appropriate Infrastructure, i.e. Hangars
- Lack of Business Confidence
- Policy Vacuum
- Regulatory Gaps

### Building the MB-80

- The MB-80 First Airship built in Western Canada
- Airship Pilot Training
  - Transport Canada Regulation CARs 421.25

### Airship Pilot Training

- Wicker basket with propane tank and burner
- Altitude and temperature gauges
- No seat belts
- No landing gear
- No flight plan or control
- No engines or propellers
- No hangar or mooring mast
- No ballonets, valves or blowers

### Pilots Hot Air Balloons versus Airships
Conclusions

- Airships are not just another aircraft
  - They require a specific regulatory framework
  - Airships cannot operate without unique infrastructure anymore than a ships can operate without dry-docks
- A worldwide competition is emerging for leadership in buoyant aircraft
  - Canada has the skills and the market to dominate the airship industry, with modest investment we can capture the business in Manitoba