

***Moving Heavy Equipment to Remote Locations:  
An Analysis of Transportation Cost, Service and Sustainability***

**Paul D. Larson, Ph.D., P.Log.  
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**Airships to the Arctic V**



UNIVERSITY  
OF MANITOBA

**Calgary**

**October 8, 2009**



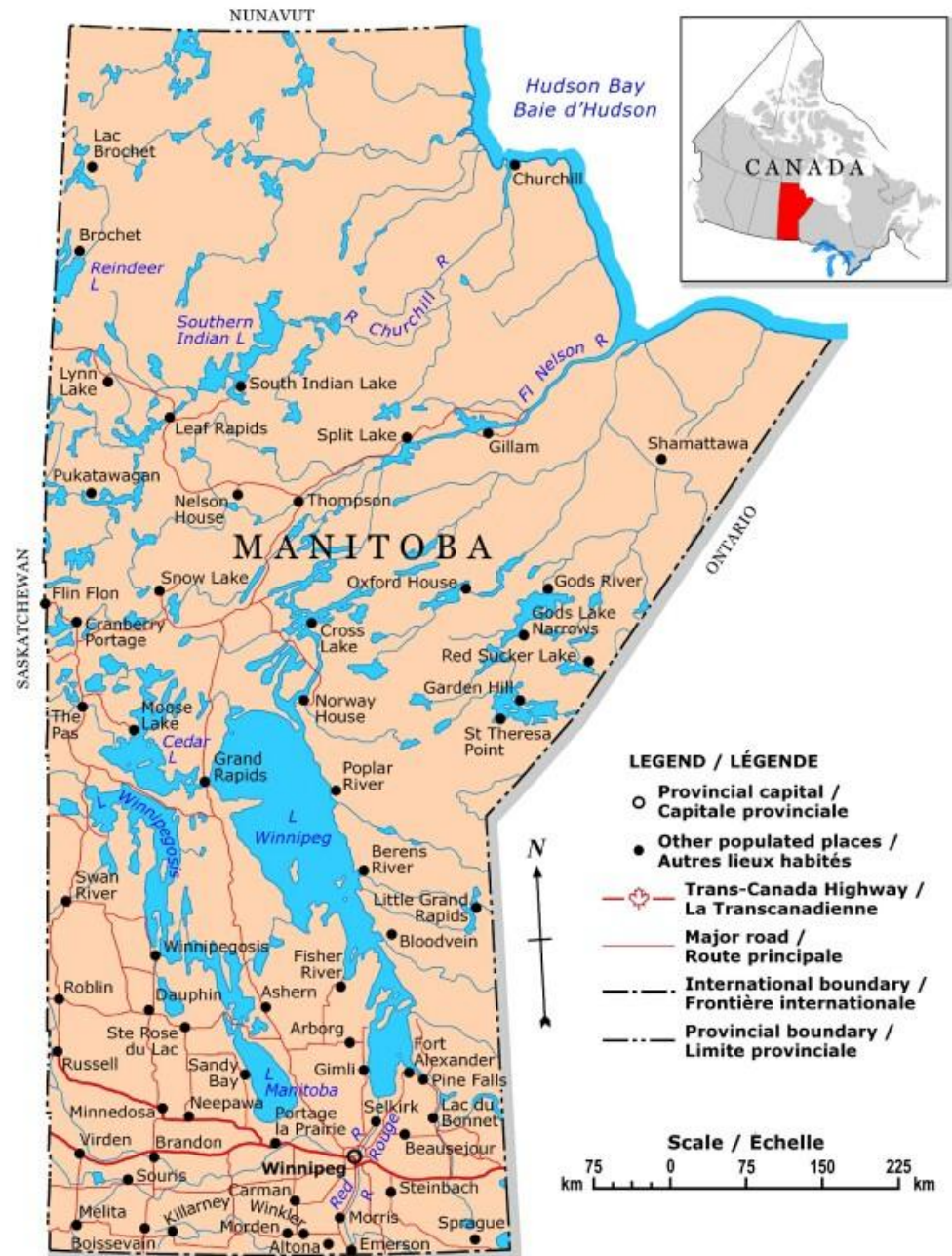


October 6, 2009

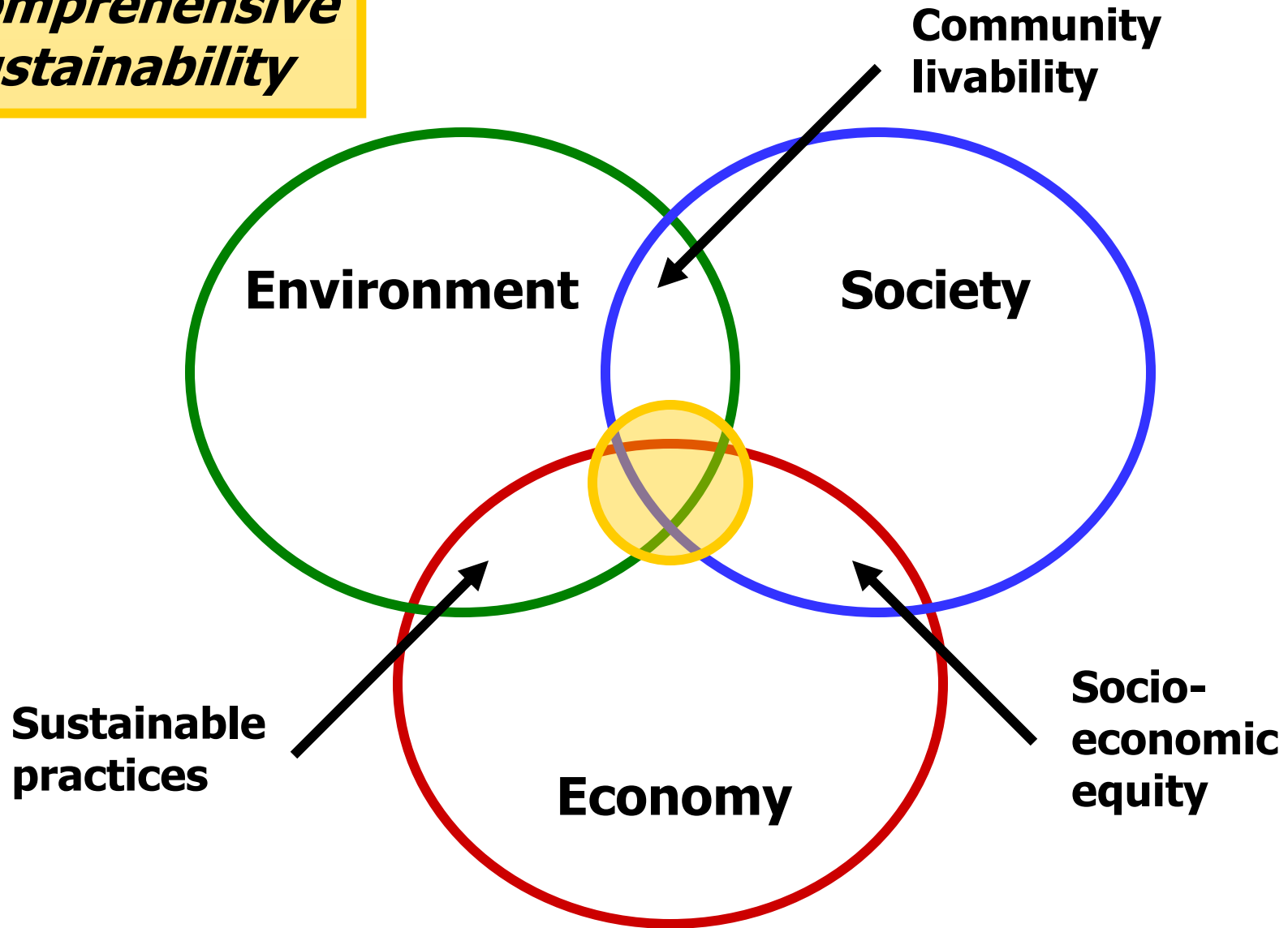
	1	2	3	4	5	6	7	8	9	10	11	12	R	H	E
Tigers	0	0	3	0	0	0	0	1	0	1	0	0	5	12	1
Twins	0	0	1	0	0	1	2	0	0	1	0	1	6	12	0

## Mission

**To facilitate  
prosperity,  
sustainability,  
and mobility.**



***Comprehensive  
Sustainability***



**Source: Centre for Sustainable Transportation, Definition and Vision of Sustainable Transportation, October 2002.**

# ***Oil Prices (US\$/barrel), 1986 - 2008***

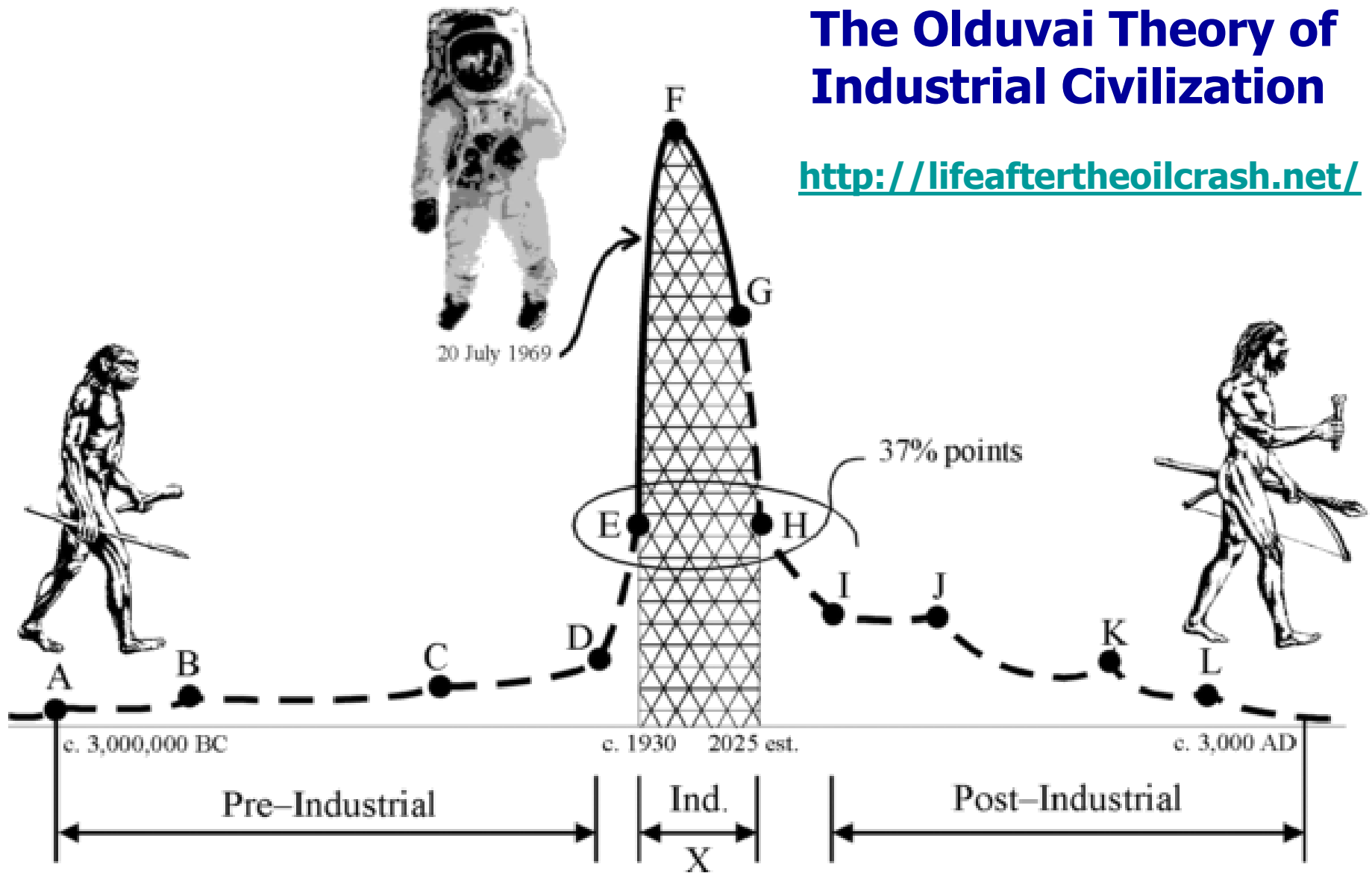


Source: U.S. Energy Information Administration

<http://tonto.eia.doe.gov/dnav/pet/hist/rwtcA.htm>

# The Olduvai Theory of Industrial Civilization

<http://lifeaftertheoilcrash.net/>



**Source: Duncan, Richard C. (1996), "The Olduvai Theory: Sliding Towards a Post-Industrial Stone Age," Institute on Energy and Man, June 27.**

***"In every deliberation we must consider the impact on the seventh generation ... even if it requires having skin as thick as the bark of a pine."***

**- Great Law of the Iroquois**



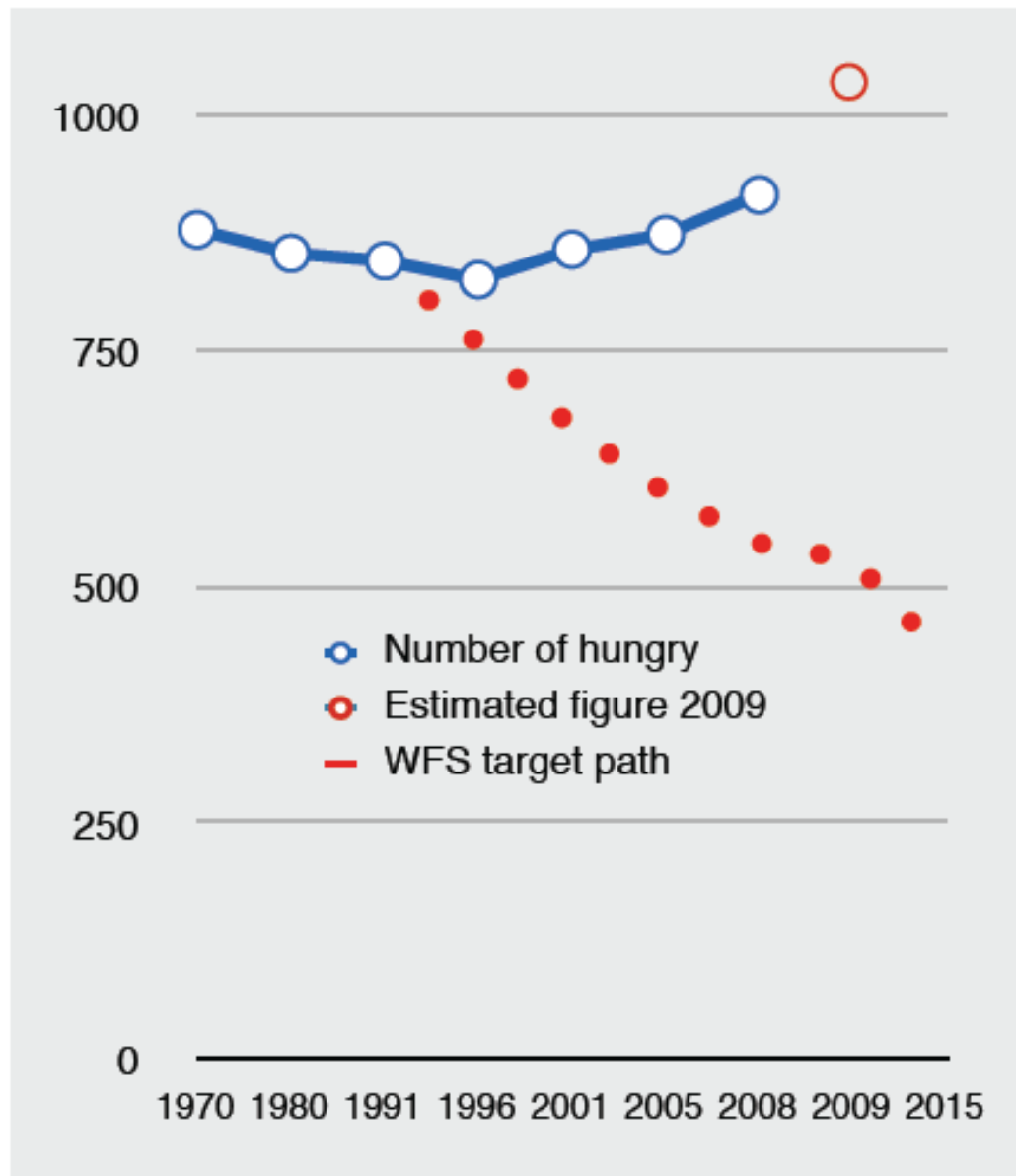
## ***Some numbers***

**540 = the number of children who will die during the next 45 minutes due to hunger and malnutrition.**

**1/6 = the portion of people in the world today who are undernourished.**



**Figure 1: Number of hungry people in the world  
(in millions)**



**Food and Agriculture  
Organization of the  
UN ([www.fao.org](http://www.fao.org))**

## ***Relationship Building in Humanitarian Supply Chains, Ottawa, Oct. 15***



HUMLOG  
Group

- 8:00 a.m. Breakfast and Registration
- 8:25 a.m. Opening Remarks – Paul D. Larson, Director, Transport Institute
- 8:30 a.m. Opening Keynote – Kevin McCort, President and CEO, CARE Canada
- 9:00 a.m. Session One
  - Vanessa Brown, Logistics Officer, Canadian Foodgrains Bank
  - Dave Carlstrom, President and CEO, Air Serv International
- 10:15 a.m. Break
- 10:30 a.m. Session Two
  - Birgitte Olsen, Head of Logistics, IFRC
  - Nancy Rivard, President, Airline Ambassadors International
- 12:00 p.m. Luncheon, with keynote speaker
  - George Fenton, Associate Supply Chain Director, World Vision International
- 1:30 p.m. Session Three
  - Mary Ennis, Executive Director, Disabled Peoples' International
  - Major Paul Gillies, Canadian Forces Joint HQ/DART
- 2:45 p.m. Break
- 3:00 p.m. Session Four
  - Amreen Choudhury, Sr. Program Officer – Roster Unit, CANADEM
  - Jeff Ashcroft, Founder, World Org. for Relief Logistics Development (WORLD)
- 4:15 p.m. Closing Remarks – Gyöngyi Kovács, Director, HumLog Institute
- 6:15 p.m. Reception, with art exhibit; Laura Archer, Artist

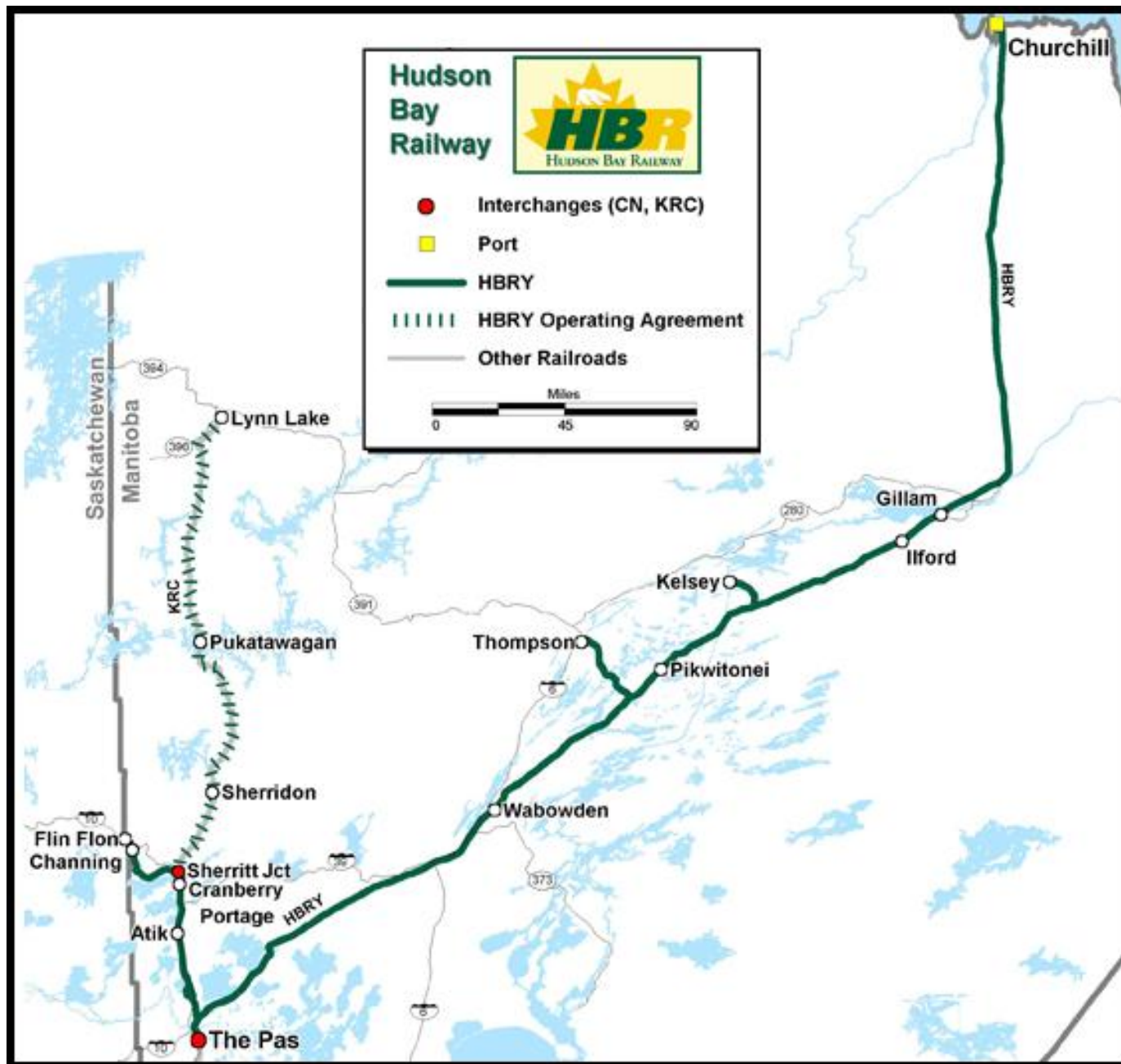


# ***Shipping a 20- to 30-tonne transformer from Winnipeg to Baker Lake, Nunavut***

- **Surface Option 1**
  - **Winnipeg to Valleyfield, Quebec by rail**
  - **Around Ungava Bay to Chesterfield Inlet by short-sea**
  - **Chesterfield Inlet to Baker Lake, Nunavut by barge**
- **Surface Option 2**
  - **Winnipeg to Thompson, Manitoba by truck**
  - **Thompson to Churchill, Manitoba by rail**
  - **Churchill to Chesterfield Inlet, Nunavut by short-sea**
  - **Chesterfield Inlet to Baker Lake, Nunavut by barge**







# ***Port of Churchill***



Scheduled sealift service offered from July to September





# ***The Options***

- **Valleyfield is circuitous, but less challenging**
- **The route North through Manitoba is more direct, but the rail leg and linkage to short-sea is challenging**
- **Another alternative: Stage the transformer in Thompson and move it the remaining 940 km. by airship direct to Baker Lake.**
- **Heavy Lift designs are under development**
  - **LTA may theoretically provide lowest cost movement, but there are operational (ground handling) limitations**
  - **HTA hybrid may be more pragmatic**



## ***Surface Option Freight Rates***

Mode	Origin	Destination	Miles	Rate
Road	Winnipeg	Thompson	476	\$2,050
Rail	Thompson	Churchill	341	\$2,238
Short Sea	Churchill	Chesterfield Inlet	326	\$5,383
Barge	Chesterfield Inlet	Baker Lake	168	
			1,311	\$9,671

## ***Cost and Service Considerations***

- **Rail and sea – lowest cost per tonne-mile; using dependable, scheduled departures and arrivals**
- **~ \$10,000 freight rate for Winnipeg to Thompson by road, rail to Churchill, and water to Baker Lake**
- **Main limitation: seasonality of short-sea in Hudson Bay**
- **If airship moved the transformer from Thompson to Baker Lake (940 km. or about 590 miles), rates are estimated at \$22,120 (\$2,050 for Winnipeg-Thompson by road + \$20,070 for Thompson-Baker Lake by airship\***

**\*Tonne-mile calculations derived from data in "Economics of Airships for Northern Re-supply" by Prentice & Thomson, 5<sup>th</sup> International Airship Convention & Exhibition.**

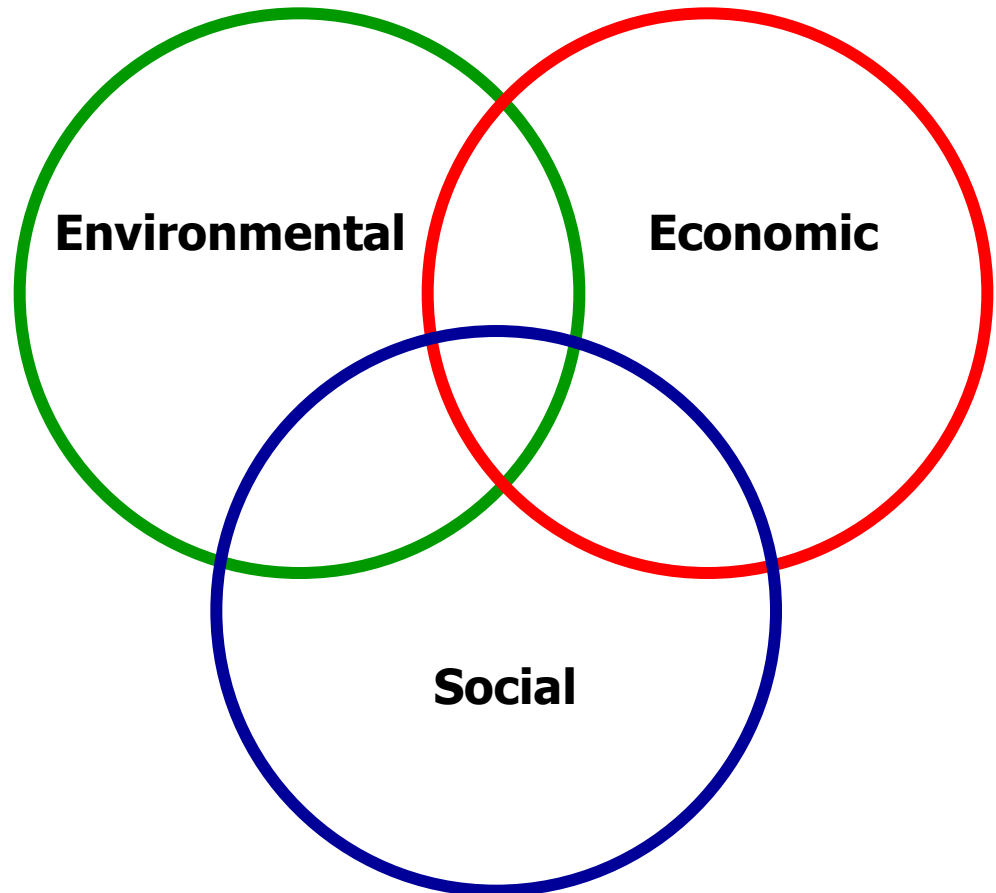
## ***Additional Considerations***

- **While less cost-effective as road/rail/sea, airship offers several advantages:**
  - **Only 1 transfer at Thompson versus 3 transfers at Thompson, Churchill and Chesterfield Inlet (costs of transfers are excluded in this analysis)**
  - **Thompson to Baker Lake by airship could be done in 1 day**
  - **Seasonality would be less of a factor in a road/airship move, allowing closer to year-round delivery**
- **Critical assumption: regularly scheduled airship service (for an “apples to apples” comparison). Further, we’re “assuming an airship,” i.e. amortization of investment and development costs are not in the equation**

# ***Manitoba Outlook on Transportation***

**Hitting the sweet spot with:**

- **Technology**
- **Public policy**
- **Supply chain best practices**
- **Modal shifts**



**“Plan for Nunavut-Manitoba road almost ready:  
Nunavut official,” [cbcnews.ca](http://cbcnews.ca), March 26, 2009.**

**“Plans to build the 1,200-km. road are on track;  
the road is expected to start in Gillam, Manitoba,  
connecting through Churchill and then up to the  
Nunavut communities of Arviat, Whale Cove and  
Rankin Inlet. The road is expected to cost about  
\$1.2 billion.”**

# ***Northern Exposure, Supply Chain Connections; April 27, 2010***





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***Thank you!***



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***SaskPower system map  
(December 31, 2008)***



<http://www.saskpower.com>