

Jared Loidolt
Transportation and Logistics Student
at
University of Wisconsin-Superior
April 2012

Intermodal Terminals in Minneapolis and St. Paul Minnesota

- There are two cities in the twin cities.
 - CPR (Canadian Pacific Railroad)
 - Address:
 - 615 30th Avenue NE
Minneapolis, MN 55418
 - BNSF (St. Paul (Midway))
 - Address:
 - 1701 Pierce Butler Route
St. Paul, MN 55104
- These cities could be used for LNG Plants for re-fueling stations. It is a 150-mile one-way trip (300 mile round trip) from Superior, WI/Duluth, MN to Minneapolis, MN/St. Paul, MN.

Trains

BN Use of Natural Gas

- (Side note: there is around 200 years of natural gas supply at current usage rates)
- Burlington Northern expects natural gas to provide a 10 to 20 percent cost savings over diesel fuel.
- BN has estimated it could save \$200 million a year in fuel purchases if it converted its entire locomotive fleet to natural gas.
- Using natural gas reduces engine maintenance costs
- It is estimated that engine life cycle can be improved by as much as 40 percent
- According to Paul Jensen, vice president of Energy Conversions Inc. and the inventor of the conversion package, "engines can go 2 to 3 times as long between lubrications, oil, and filter changes."
- BN used a highly purified form of LNG produced by Air Products called Refrigerated Liquid Methane (RLM)

- The tender car is double-walled super vacuum-insulated. It carries 20,000 gallons of the cryogenic fuel, enough for two locomotives to complete a 1,600 mile trip. Made of stainless steel the tank is designed to keep the LNG cooled for 14 days
- BN and ECI (talked about later in the notes) created an engine (the EMD 645 E3B diesel engine) to run on diesel and natural gas
- Natural gas has a very low chance of igniting, lower than diesel.
- In the unlikely event of a tender leak, the LNG would boil into a gas and then evaporate, since it's lighter than air.
- Natural gas has a higher ignition temperature than petroleum products; thus a fire is less likely.

ECI System

- Energy Conversions Inc's dual fuel conversion systems are designed to retrofit a General Motors EMD 645 or 710 engines for natural gas operation. The ECI conversion of the EMD engine is designed with ease and economy of installation in mind, the kit may be installed by maintenance personnel over the course of a routine class overhaul.
- ECI's system is the first and only to operate successfully under the sustained rigors of commercial long haul locomotion.
- The Burlington Northern's successful demonstration of two ECI equipped dual fuel locomotives, 7890 and 7149, provided nearly 5 years of full time dual service from 1991 to 1996
- Fuel is carried in a tender car
- The tandem of 7890 and 7149, for example used a single 20,000 gallon tender on its 1600 mile coal route, refueling once each way at a fueling system located at the half way point. The 800 mile range per locomotive pair (second half of the first paragraph on this webpage <http://www.energyconversions.com/tender.htm>)
- 20,000 gallons/800 mile range = 25 miles to the gallon
- <http://www.energyconversions.com/loco2.htm> (main website to the one above)