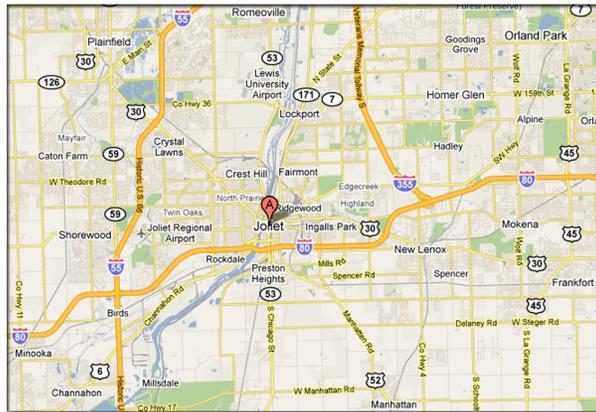
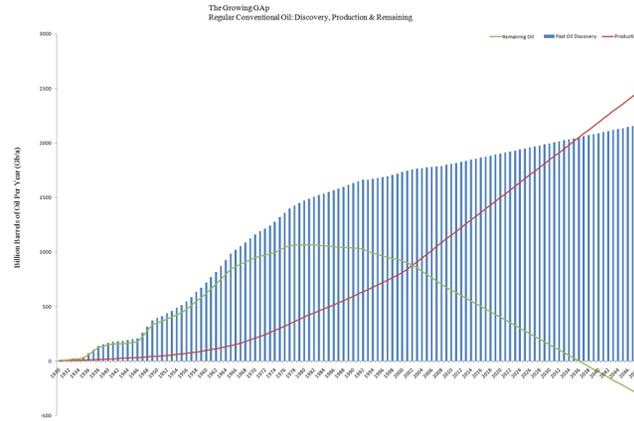


## PROBLEM STATEMENT

OUR GOAL IS TO RESEARCH THE IMPACT OF OPENING AN INTERMODAL FACILITY IN JOLIET, ILLINOIS. COLLABORATING WITH MI-JACK, WE WILL ALSO LOOK AT CURRENT AND FUTURE LAYOUTS AND TECHNOLOGIES OF INTERMODAL YARDS IN ORDER TO INCREASE EFFICIENCY.



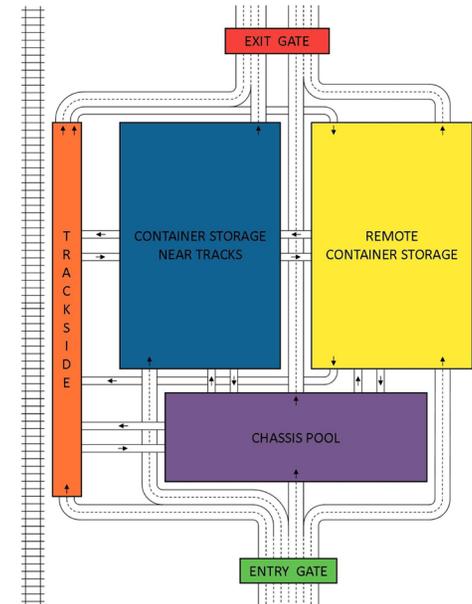
## PEAK OIL CHART



## ALTERNATIVE FUELS TABLE

Fuel Type	Availability	Cost of fuel (gall)	Vehicle Alterations Required	Processed on site?	Efficiency	Emissions
Vegetable Oil	Local greasy food restaurants and factories. As of 2000 the United States was producing in excess of 2.9 billion gallons of waste vegetable oil annually. MVO, SVO, PPO.	Free other than initial cost for filtration system	Diesel car with separate tank for vegetable oil containing heating element and a three way valve.	Settling tanks.	85-95% efficient compared with petroleum based diesel	Less carbon dioxide and sulfur. More nitrous oxides
Biodiesel	Same as vegetable oil; fats and oils from sources such as soy beans, waste cooking oil, animal fats, and rapeseed	Initial investment in reactor required. Costs are dependent on cost of methanol and catalyst used to create fuel	None for newer cars. Older cars require replacing rubber fuel lines with biodiesel compatible lines.	Yes?	90-95% efficient compared with petroleum based diesel fuel. B100 has 103% the energy of gasoline or 95% of diesel. B20 has 109% of gasoline or 99% of diesel.	Biodiesel is domestically produced, renewable, and reduces petroleum use 95% throughout its lifecycle.
Algae Fuel (biodiesel/biobutanol)	Can be grown on ocean or wastewater. Yields claims cover a vast range from 5,000 to 150,000 US gallons of oil per acre per year. Algae can produce 15-300 times more oil per acre than conventional crops.	Biodiesel (B100) can be run in any diesel engine. In most gasoline engines, biobutanol can be used in place of gasoline with no modifications.	Biobutanol has an energy density 10% less than gasoline, and greater than that of either ethanol or methanol.	No. Expensive process of converting algae to biodiesel or biobutanol. Photobioreactors. Closed loop systems. Open pond, Fermentation tanks.	The energy in 2.2 to 1.6 kg of hydrogen gas is about the same as the energy in 1 gallon of gasoline. H2 has 44.4% the energy in 1 gal gasoline.	Depends on the production process. Systems have been made to recycle CO2 emissions from power plants.
Hydrogen fuel cell	Hard to acquire. Mining and domestic mass quantities is impractical and costly. Non-existent infrastructure.	With renewable energy produced on site, gas only costs initial installation of equipment + maintenance.	Basically an electric car with hydrogen tank, a fuel cell tank, and an air compressor.	Production on site makes for less distribution costs, but higher production costs.	The energy in 2.2 to 1.6 kg of hydrogen gas is about the same as the energy in 1 gallon of gasoline. H2 has 44.4% the energy in 1 gal gasoline.	Depends on type of production of hydrogen and oxygen (renewable energy?)
Propane/LPG	A by-product of petroleum refining or natural gas processing. Approximately half of the LPG in the U.S. is derived from oil, but no oil is imported specifically for LPG production.	Gasoline and diesel vehicles can be retrofitted to run on LPG in addition to conventional fuel. The LPG is stored in high-pressure fuel tanks, so separate fuel systems are needed in vehicles powered by both LPG and a conventional fuel such as gasoline.			73% compared to gasoline.	Fewer toxic and smog-forming air pollutants.
Ethanol	Abundant in Midwest. Comes from corn, grains, or agricultural waste (cellulose).	It is cheaper than gasoline in some areas, such as the Midwest, and more expensive in others.		No. (switch grass?)	Lower energy content, resulting in fewer miles per gallon (20-30% drop in miles per gallon). E100 contains 46%, E85 contains 72% to 77%.	Lower emissions of air pollutants. Ethanol is produced domestically. E100 reduces petroleum use by 70% and E10 reduces petroleum use by 6.3%.
CNG	Domestic, available around the world. Underground reserves.	Less expensive than oil. Anywhere from 50¢ to \$2.50 in the midwest. Usually just over \$1.		No, extensive processing. Remove byproducts: ethane, propane, butane, pentane and higher molecular weight hydrocarbons, elemental sulfur, and sometimes helium and nitrogen.	Volume @ dispenser: 3000-3800 PSI. 1 lb CNG has 17.5% the energy of 1 gal gasoline.	50-90% less smog-producing pollutants. 30-60% less greenhouse gas emissions.
LNG	Domestic, available around the world. Underground reserves.	Less expensive than oil.		No. Remove hydrocarbons, sulfur compounds and water. Then cool to -256F. Then shipped by insulated LNG tankers.	Same horsepower and performance as diesel counterparts. 64% compared to gasoline.	Cleaner for the environment than diesel.

## TRADITIONAL FACILITY LAYOUT



## OBJECTIVES

1. ANALYZE THE IMPACT OF PEAK OIL
2. RESEARCH ALTERNATIVE FUEL SOURCES AND IDENTIFY THEIR APPLICATIONS
3. MAP THE PROPOSED FACILITY
4. COMPARE THE USE OF PATHFINDER TECHNOLOGY TO TRADITIONAL LAYOUTS
5. CREATE A COMPUTER PROGRAM THAT CAN BE USED TO TEST THE EFFICIENCY OF AN INTERMODAL FACILITY LAYOUT
6. DEVELOPE AN ANIMATED VIDEO TO VISUALIZE HOW A FACILITY FUNCTIONS
7. PROPOSE A DESIGN FOR AN ALTERNATIVE FUEL STATION LOCATED ADJACENT TO THE INTERMODAL FACILITY

## LAYOUT WITH PATHFINDER

