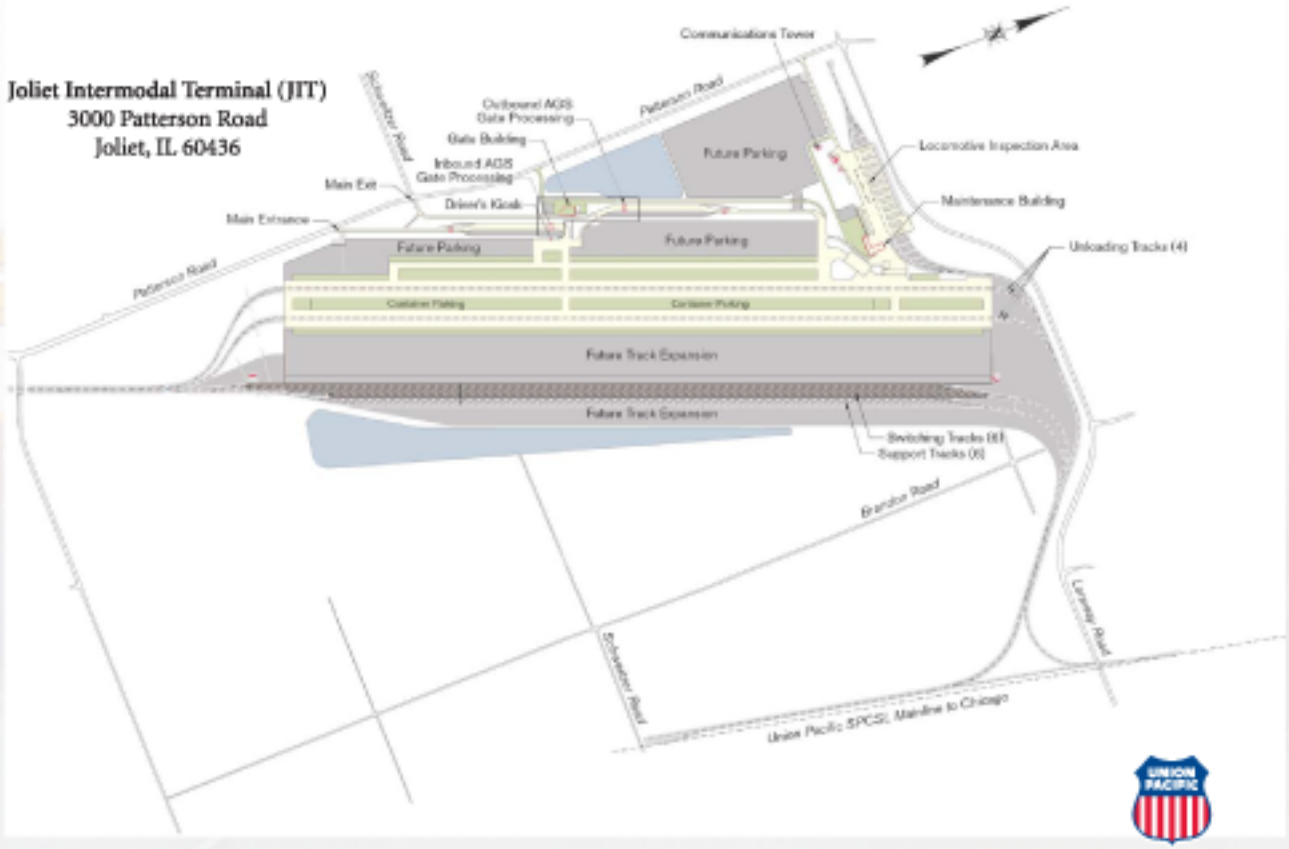

MI-JACK
TRANSLIFT
NS
NORFOLK SOUTHERN
11-1281

Chicago is the third largest intermodal freight hub in the world. Joliet, being so close, makes a great place as a depot to intercept much of Chicago's goods. It is also far enough away to avoid further congestion in the city. Currently one hub exists in Joliet (Elwood BNSF), another is being developed (Centerpoint), and one is being proposed off of Lorenzo road. Our sponsor, Mi-Jack, has asked us to determine the difference in efficiency between a regular wide span gantry system and thier new Pathfinder system.



EFFICIENCY OF PATHFINDER TECHNOLOGY

LOGISTICS AND IMPACT OF BRINGING ANOTHER INTERMODAL FACILITY TO JOLIET

FEASABILITY OF ALTERNATIVE FUELS

3 PROBLEMS - 3 GROUPS - 3 SOLUTIONS

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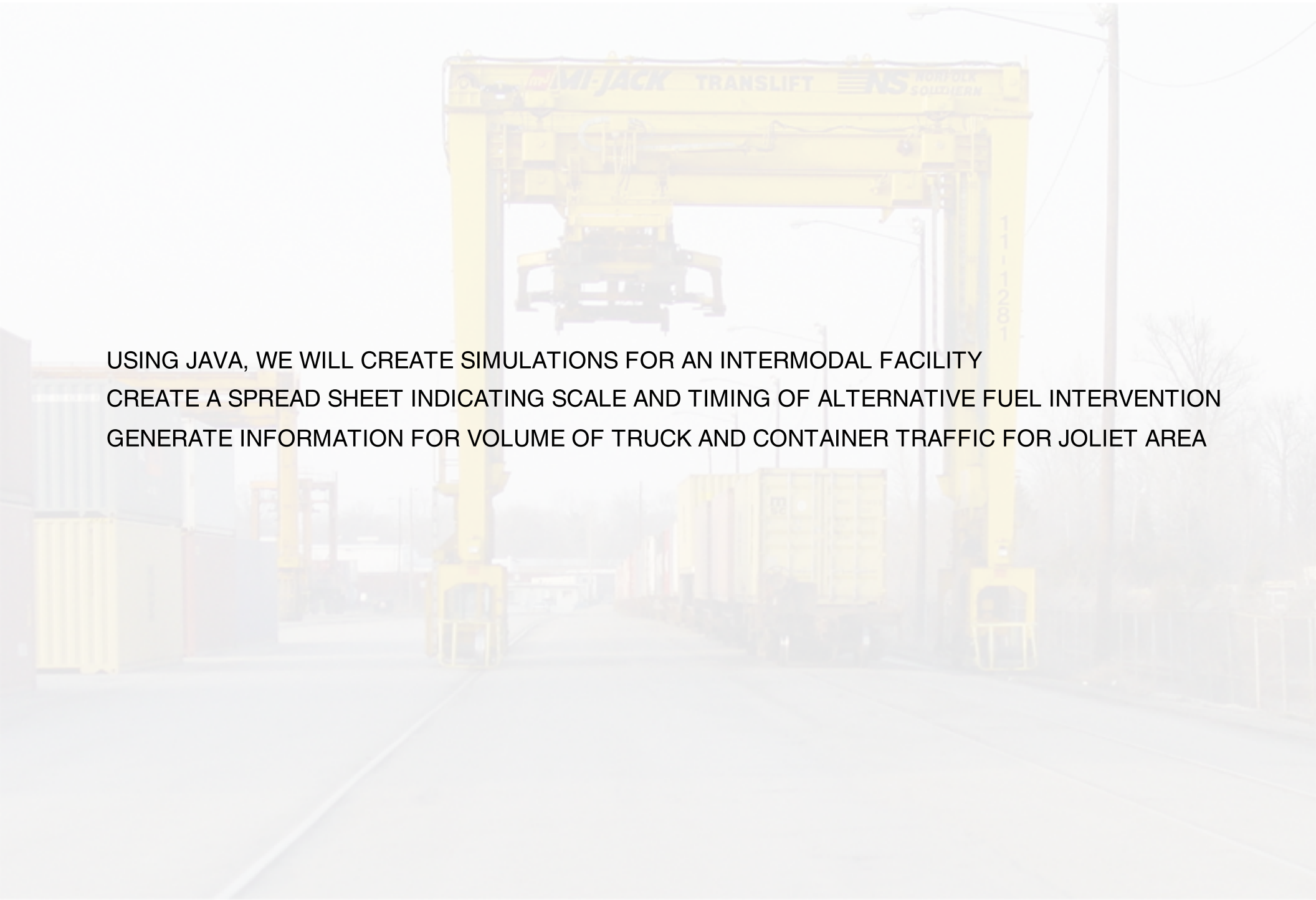
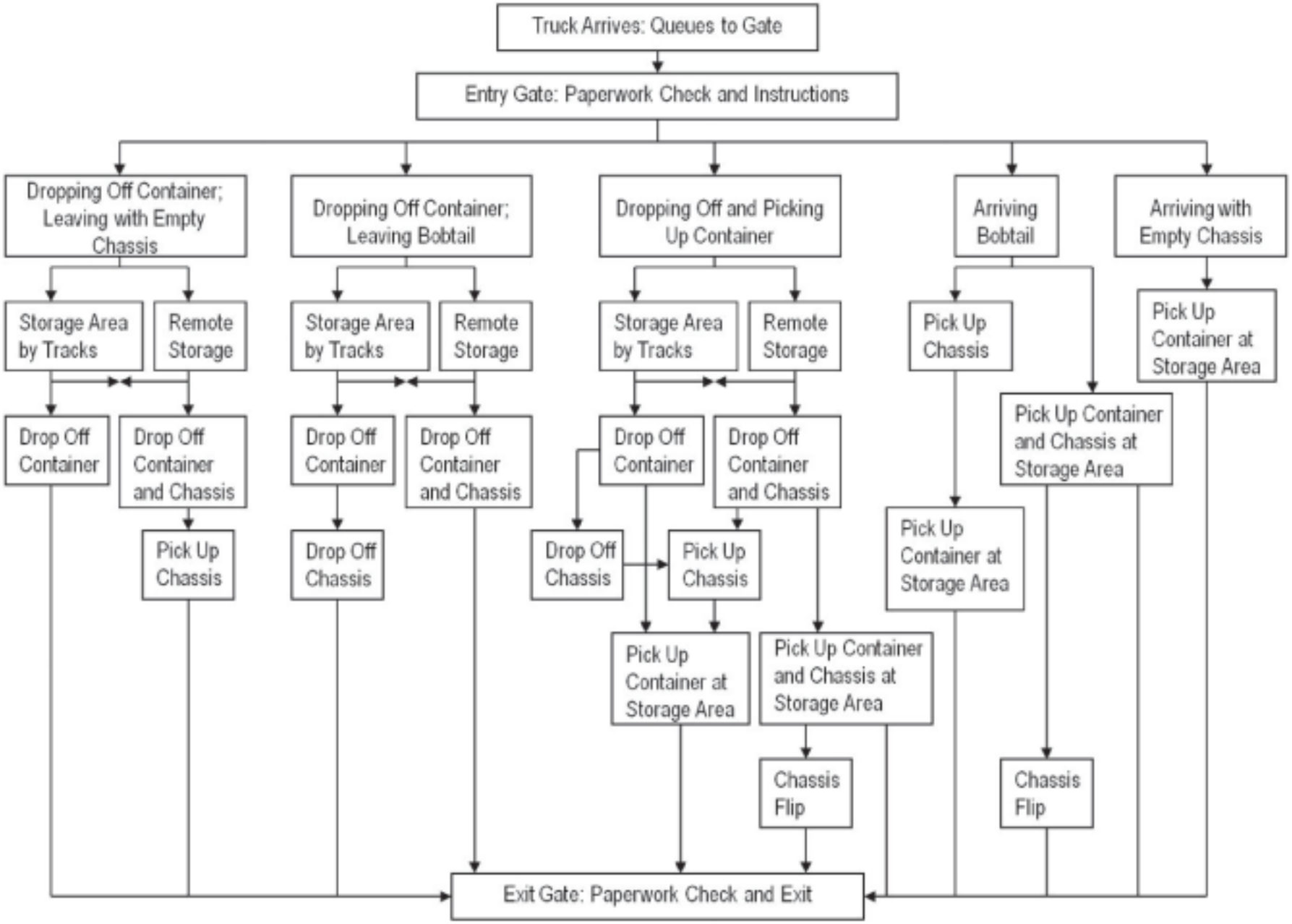


USING JAVA, WE WILL CREATE SIMULATIONS FOR AN INTERMODAL FACILITY

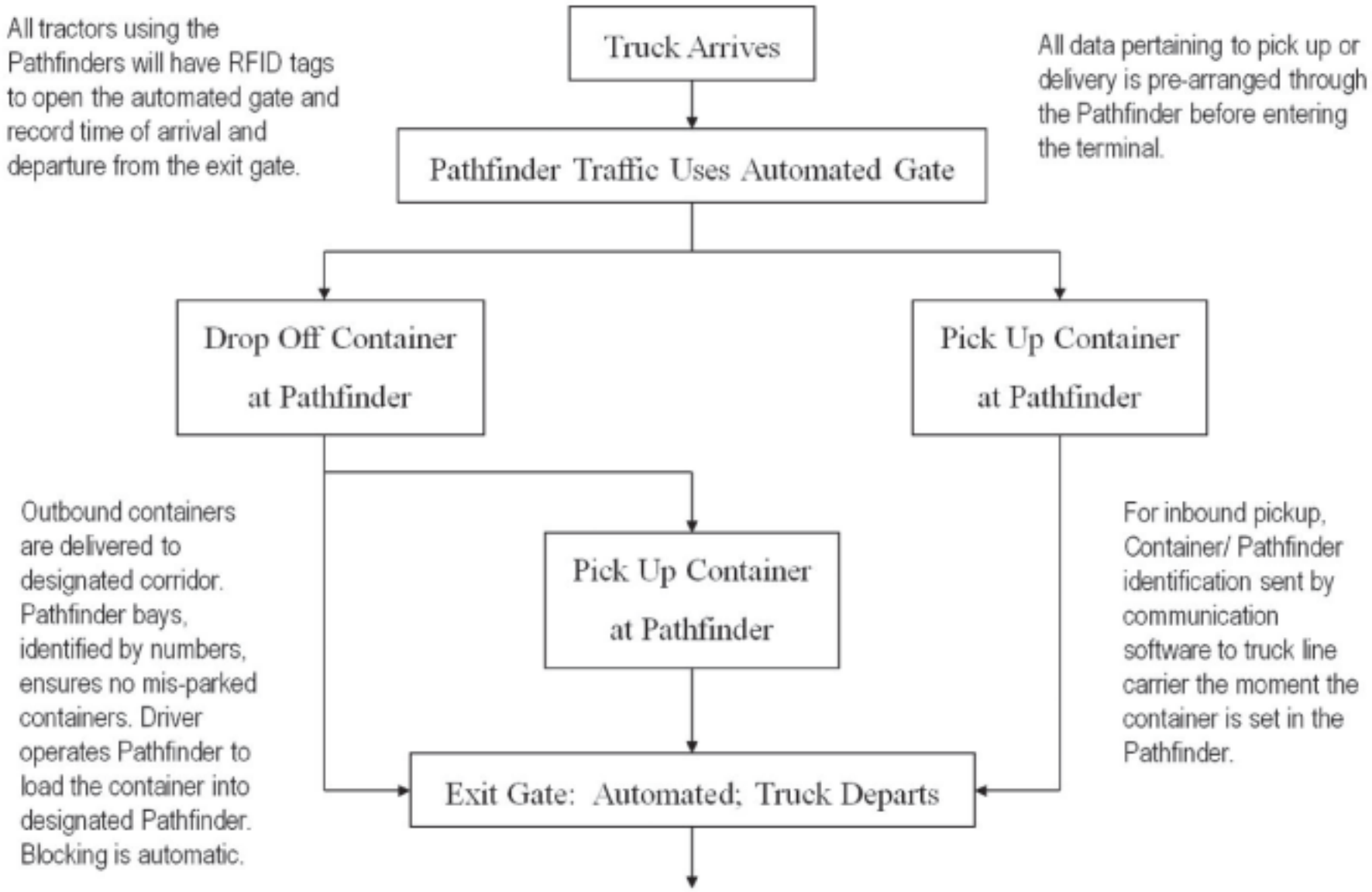
CREATE A SPREAD SHEET INDICATING SCALE AND TIMING OF ALTERNATIVE FUEL INTERVENTION

GENERATE INFORMATION FOR VOLUME OF TRUCK AND CONTAINER TRAFFIC FOR JOLIET AREA

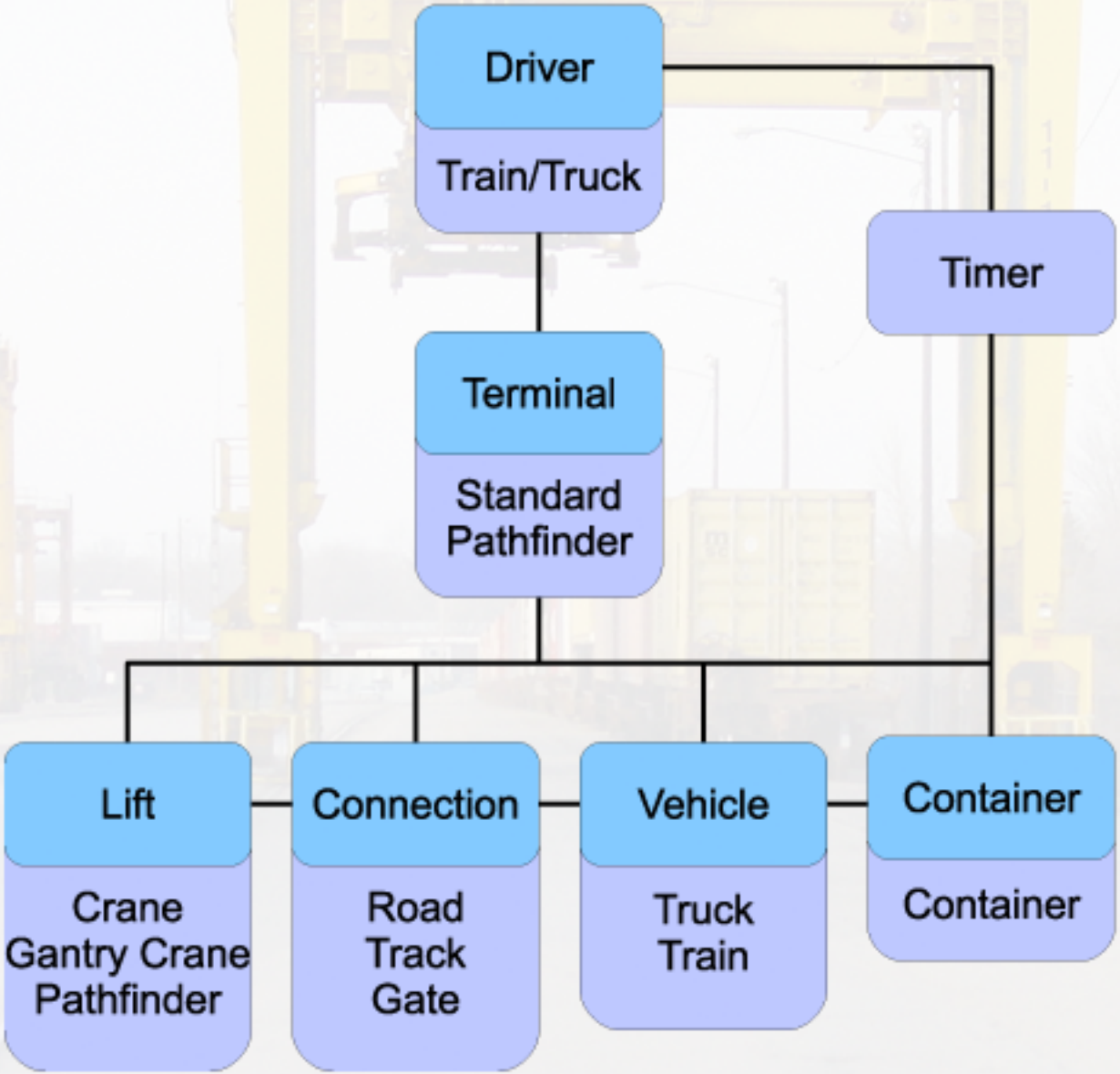
Truck Processes: Conventional Terminal

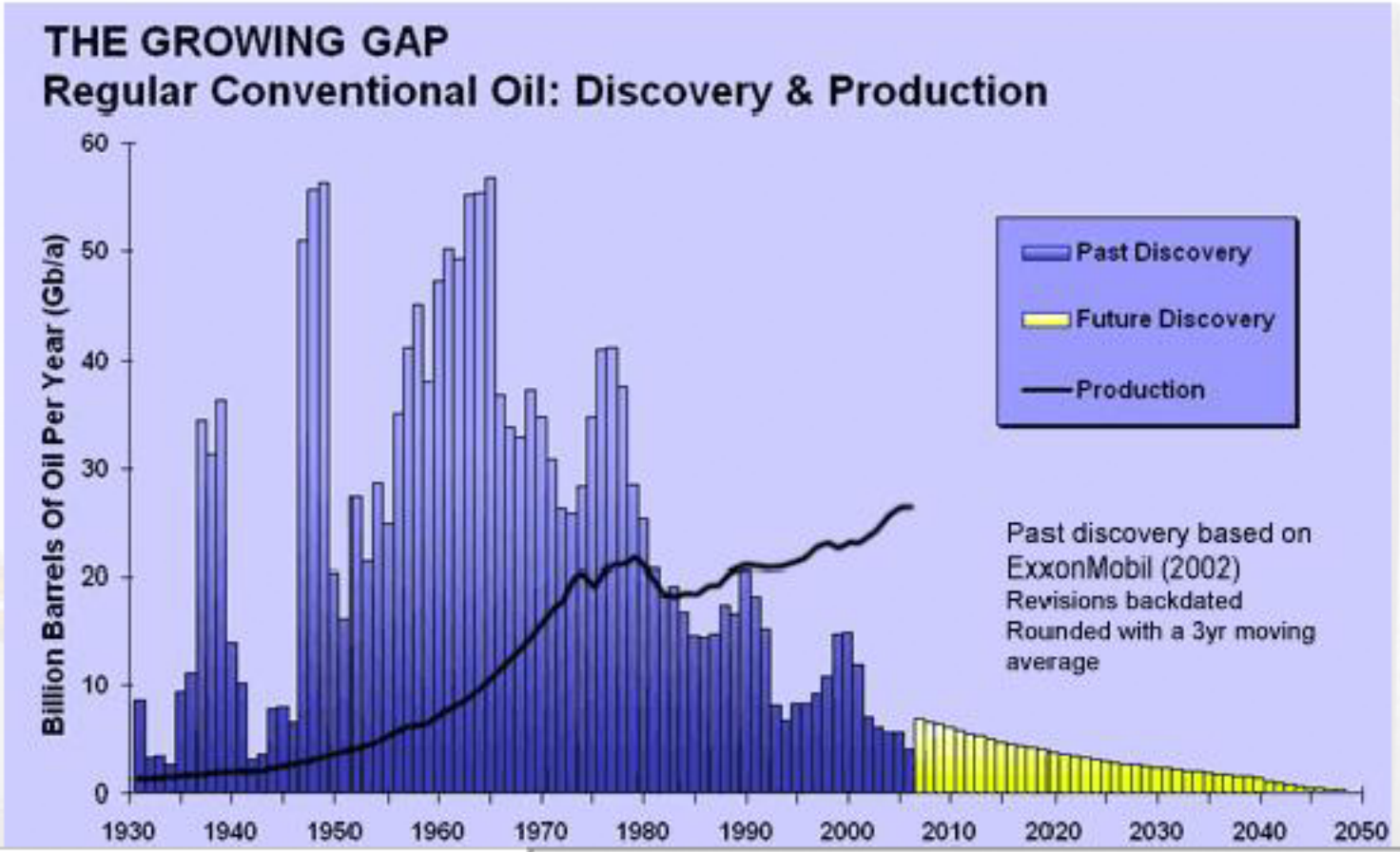


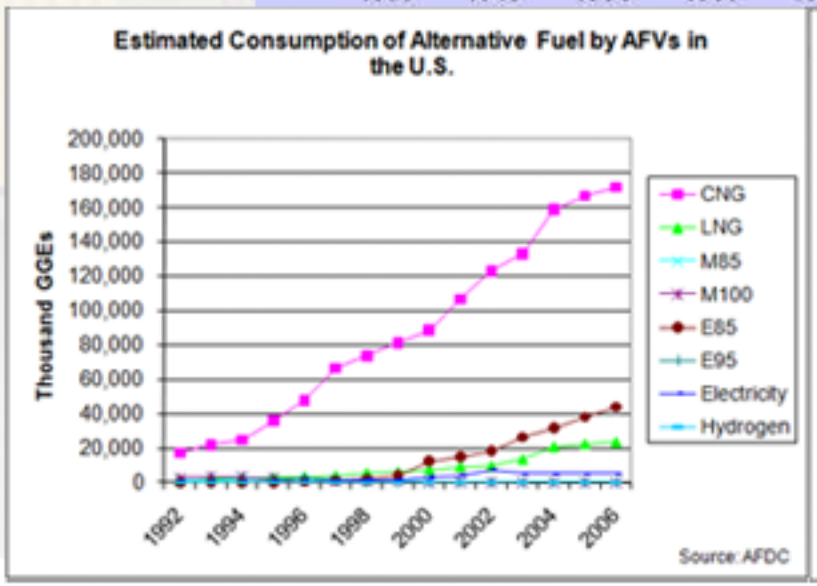
Truck Processes: Terminal with Pathfinders

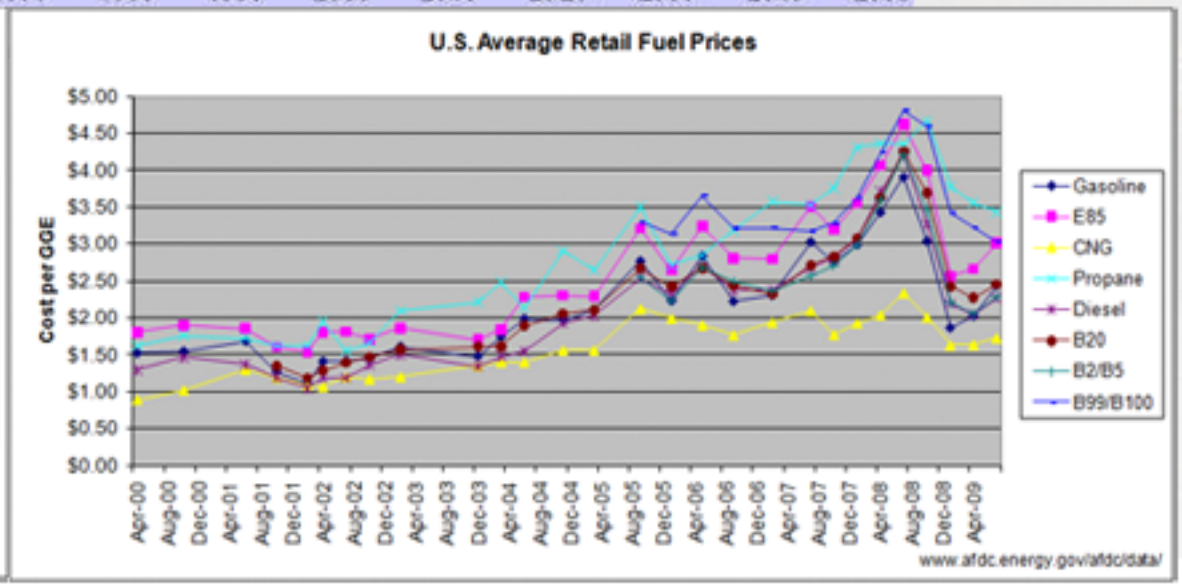


Intermodal Systems Simulator

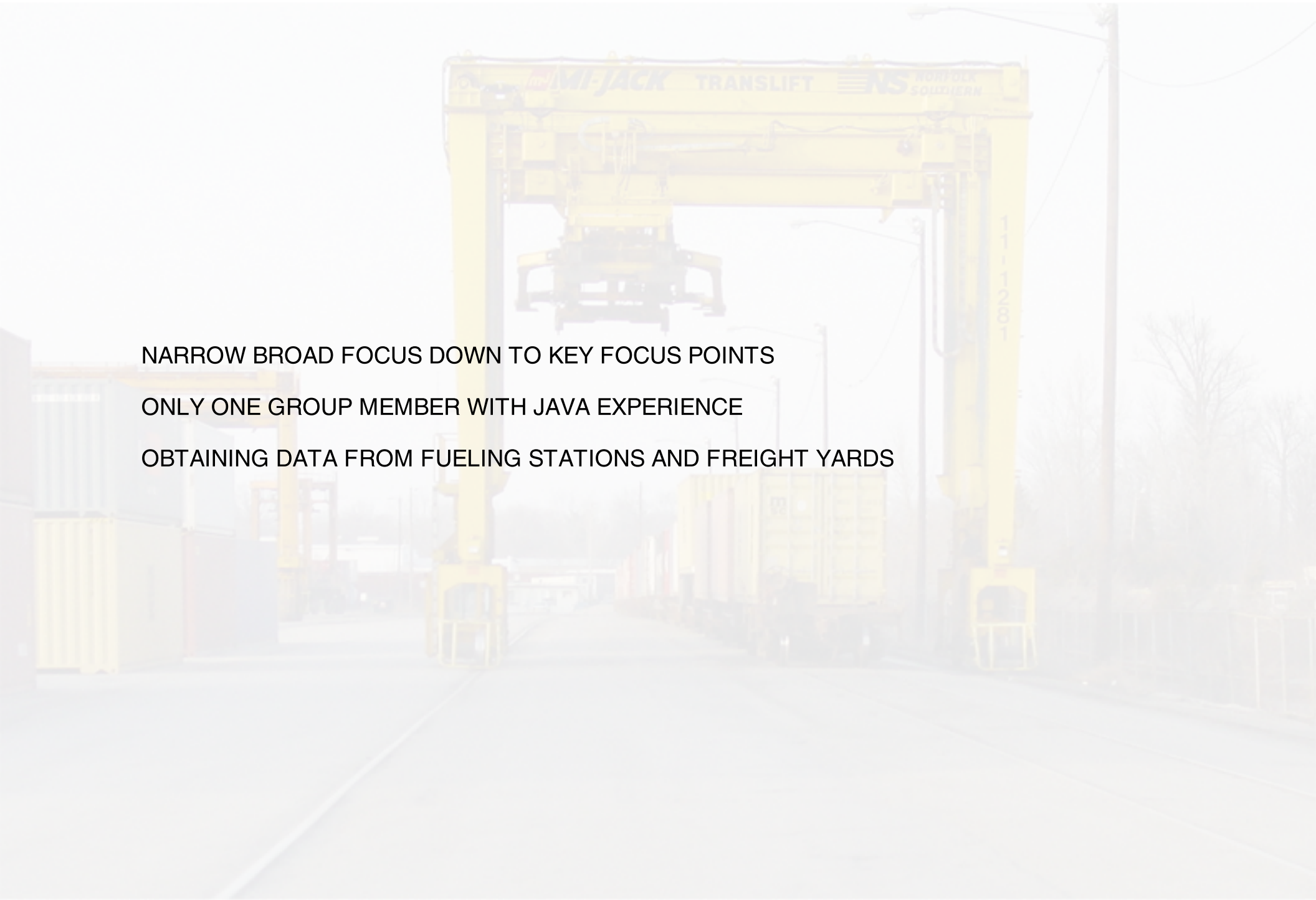



THE GROWING GAP
Regular Conventional Oil: Discovery & Production
Billion Barrels Of Oil Per Year (Gb/a)
60
50
40
30
20
10
0
1930
1940
1950
1960
1970
1980
1990
2000
2010
2020
2030
2040
2050
Past Discovery
Future Discovery
Production
Past discovery based on ExxonMobil (2002)
Revisions backdated
Rounded with a 3yr moving average


Estimated Consumption of Alternative Fuel by AFVs in the U.S.
Thousand GGEs
200,000
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
1992
1994
1996
1998
2000
2002
2004
2006
CNG
LNG
M85
M100
E85
E95
Electricity
Hydrogen
Source: AFDC


U.S. Average Retail Fuel Prices
Cost per GGE
$5.00
$4.50
$4.00
$3.50
$3.00
$2.50
$2.00
$1.50
$1.00
$0.50
$0.00
Apr-00
Aug-00
Dec-00
Apr-01
Aug-01
Dec-01
Apr-02
Aug-02
Dec-02
Apr-03
Aug-03
Dec-03
Apr-04
Aug-04
Dec-04
Apr-05
Aug-05
Dec-05
Apr-06
Aug-06
Dec-06
Apr-07
Aug-07
Dec-07
Apr-08
Aug-08
Dec-08
Apr-09
Gasoline
E85
CNG
Propane
Diesel
B20
B2/B5
B99/B100
www.afdc.energy.gov/afdc/data/

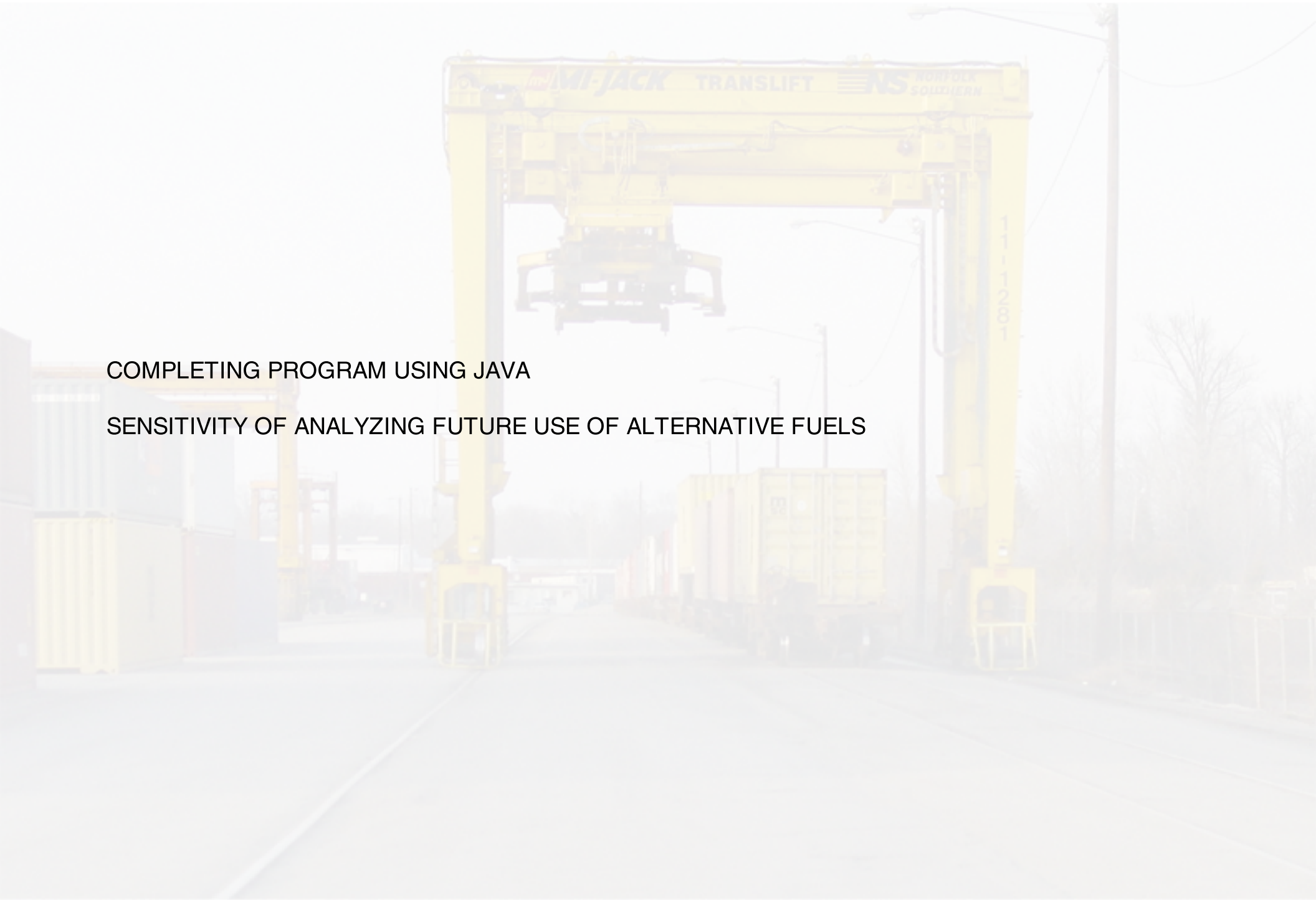
Fuel Type	Availability	Cost of fuel (gal)	Vehicle Alterations Required	Processed on site?	Efficiency	Emmisions	Pros	Cons	Possible Roll-out Date
Vegetable Oil	Local greasy food restaurants and factories. As of 2000 the United States was producing in excess of 2.9 billion gallons of waste vegetable oil annually. WVO, 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	From current production 1% of US oil consumption could be offset. Not very difficult or costly.	The EPA clearly states it is illegal to burn SVO.	Viable as a fuel today. Small systems with a centrifuge can handle 5-7 gallons per hour. Larger systems are feasible
Biodiesel	Same as vegetable oil	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		Could offset 1% of US oil consumption. No vehicle modification necessary	Dangerous chemicals need to be used in production	Viable as a fuel today. 100 gallon per day reactors can be acquired easily
Algae Fuel	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.	No. Expensive process of converting algae to biodiesel or biobutanol. PhotoBioreactors, Closed loop system, Open pond, Fermentation tanks.	Biobutanol has an energy density 10% less than gasoline, and greater than that of either ethanol or methanol.	Depends on the production process. Systems have been made to recycle CO2 emissions from power plants.	The United States Department of Energy estimates that if algae fuel replaced all the petroleum fuel in the United States, it would require 15,000 square miles	Energy losses due to converting the algae lipids into fuels.	
Hydrogen fuel cell	Hard to acquire. Moving and storing mass quantities is unpractical and costly. Non-existent infrastructure.	With renewable energy produced on site, gas only costs initial instalation of equipment + maintanence.	Basically an electric car with hydrogen tank, a fuel cell stack, and an air compressor.	Production on site makes for less distribution costs, but higher production costs.	The energy in 2.2 lb (1 kg) of hydrogen gas is about the same as the energy in 1 gallon of gasoline.	Depends on type of productiovnof hydrogen and oxygen (renewable energy?)	potential for near-zero greenhouse gas. Doesn't need to be imported. Low noise.	low volumetric energy density calls for a large tank. Moving and storing mass quantities is unpractical. Lack of infrastructure. Cost.	Fueling stations already exist in southern California. Fuel cost is comparable to gasoline.
Propane								Extremely explosive	
Ethanol								In the US, takes 1 gallon of fossil fuel to produce 1.3 gallons of ethanol. Less efficient than gasoline	Already avaiable at many gas stations around the country
CNG							Most abundant natural resource in the US (could lessen dependence on foreign countries)	Only slightly "greener" than petroleum based fuels	Not currently available at gas stations. Home fueling stations are available



NARROW BROAD FOCUS DOWN TO KEY FOCUS POINTS

ONLY ONE GROUP MEMBER WITH JAVA EXPERIENCE

OBTAINING DATA FROM FUELING STATIONS AND FREIGHT YARDS



COMPLETING PROGRAM USING JAVA

SENSITIVITY OF ANALYZING FUTURE USE OF ALTERNATIVE FUELS