The Oil Network in US:
A Closer Look at Pipelines

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History of Oil Network in US

- **Origin of pipelines:**
  - WWII: Relied on tankers but were sunk by German submarines
  - US Government made an effort to find alternative modes of transportation

- **Need for a complex network:**
  - Move the raw materials (crude oils), from where they are produced to where they are processed
  - Move refined products from where they are processed to where they are consumed.
Facts about Oil in US

- The U.S. consumes about 19.5 million barrels / day (b/d) of petroleum products.
  - By 2010, it is estimated to be about 22-24 million b/d

- Distances involved can be enormous:
  - Crude and products arriving from the Middle East have already traveled more than 10,000 miles
  - Still need to be shipped thousands of miles across the U.S

- US has largest, system-optimized network of oil pipelines in the world
Modes of Oil Transportation

- Pipelines
- Water Carriers (tankers)
- Trucks
- Railcars
Comparing Transportation Modes

- Transportation modes are chosen on the basis of cost
- **Pipelines:**
  - Most economically feasible
- **Tankers:**
  - Comparable in cost to pipelines
  - Restricted by geography
- **Trains:**
  - Replacing a 1000 mile long, 150,000-barrel per day pipeline with a unit train of 2000-barrel tank cars would require a 75-car train to arrive and be unloaded every day, again returning to the source empty, along separate tracks, to be refilled.
- **Trucks – Most expensive:**
  - Trucking costs escalate sharply with distance
  - Assuming each truck holds 200 barrels, traveling 500 miles per day, it would take a fleet of 3000 trucks, with one truck arriving and unloading every 2 minutes, to replace the same pipeline
Pipelines deliver more than 2/3 of petroleum in US every year
This is more than 600 billion gallons per year
Reduced Link Cost using Pipelines

- Pipeline transports a variety of products at once
- No need for a “return trip” that trains and trucks need to take
- Ability to easily move large volumes, long distances
Canadian Crude Oil Flows
Major Refined Product Pipelines
Possible Problems

- **Security threats**
  - Node or link destroyed from terrorists

- **Natural disasters**
  - Corrosion
    - Damage caused the eastern leg of BP pipeline system to cut production in half to 200,000 barrels a day
  - Hurricanes
    - New Orleans
Important Hubs
**Summary**

- **Illinois contains crucial links and nodes**
  - Extremely important hubs for both crude and refined oil
  - Connects Canadian supply of crude to the rest of the nation
  - Center of most flows in America
  - Need to insure proper maintenance and security

- **Recommend the analysis of an additional hub in the vicinity of Missouri**
  - Balance the flow of oil
  - Help prevent catastrophic failure
References

- Association of Oil Pipe Lines, [www.aopl.org](http://www.aopl.org)
- Pipeline 101, [www.pipeline101.com](http://www.pipeline101.com)
- American Petroleum Institute, [www.api.org](http://www.api.org)