Pipeline Construction: Jargon

1. Alignment
2. Pig (smart or dumb?)
3. ECD
4. HCA’s (Class 1-4)
Pipeline Construction: Components

1. Right of way (construction vs permanent)
2. Access roads (temporary and permanent)
3. Lay down yards
4. ATWS: additional temporary workspace
5. Compressor stations (every 50-100 miles)
6. Valves/regulators (manual or automated)
7. Pig launchers and receivers
8. City Gate (reduce pressure to .25-200 psi)
9. Pressure: 200-1500 psi
Pipeline Construction: Process order

1. Clearing, grading and trenching
2. Stringing, welding and coating
3. Lowering and backfilling
4. Restoration
Clearing, grading and trenching

Trench depth: 30-36”; 48-60” if warranted by a high consequence area HCA
Stringing, bending, welding and coating

40-80' segments
Fabricated in steel rolling mills
Lowering and backfilling
Hydrostatic Testing, Restoration, and Cathodic Protection
Pipeline Construction: Water bodies

1. Open-cut crossing
2. Dry-ditch crossing
   1. Dam and Pump
   2. Flume
   3. HDD
Open-cut crossing (wet)

No stream diversion

Pipe is installed while stream runs through the site

Substantial sedimentation
Dry-ditch crossing – dam and pump

Stream is dammed and water is moved across the site via a temporary pipe and pump, if needed
Dry-ditch crossing – flume crossing

Stream is dammed and a culvert is installed
Dry-ditch crossing – HDD

A Horizontal Directional Drilling Rig
B Watercourse
C Pre-welded Pipe Section

Horizontal drilling under a body of water
HDD – Horizontal Directional Drilling
Problems

1. Falsified x-rays
2. Coating deterioration due to exposure
3. ECD failure
4. Post-construction issues
Coating deterioration

3M Scotchkote Fusion Bonded Epoxy degrades with exposure to sunlight, wind, rain
ECD Failure

Spartanburg County, SC April 2018
Post-construction issues: pop up

1969  Spartanburg County DCGT 8” pipeline  2017
Post-construction issues: erosion

Spartanburg County
DCGT 2018
New pipeline already experiencing problems
Post-construction Safety

- PHMSA – Office of Pipeline Safety
  (www.phmsa.dot.gov/pipeline)

- State (SC Office of Regulatory Staff) – can inspect and regulate but not enforce safety issues
  (www.regulatorystaff.sc.gov/safety)
Understanding Flow and Use

Cubic feet: volume
Dekatherms: energy

1 Billion cubic feet/day = 1M dekatherms/day

MVP = 2Bcf/d and 2M dkth/d
ACP = 1.5Bcf/d and 1.5M dkth/d
Understanding Flow and Use

500MW power plant requires 84,000 dkth/day at peak

Industrial users range from 50dkth/d to 3,000 dkth/d

1M dkth/d can fuel 5M homes/d

84,000 50-3,000 .2
900,000 dkth/d
But generally uses half
(DCGT Contracted Capacity)
Exports, International Market Growth and Price

Elba Island - Georgia

Liquefying NG for export
-260 degrees + purification
600cf reduced to 1cf
Tanker holds 3Bcf
North American LNG Import/Export Terminals

**Existing**

**Import Terminals**

- **U.S.**
  - A. Everett, MA: 1.035 Bcf/d (GDF SUEZ - DOMAC)
  - B. Cove Point, MD: 1.8 Bcf/d (Dominion - Cove Point LNG)
  - C. Elba Island, GA: 1.6 Bcf/d (El Paso - Southern LNG)
  - D. Lake Charles, LA: 2.1 Bcf/d (Southern Union - Trunkline LNG)
  - E. Offshore Boston: 0.8 Bcf/d (Excelerate Energy - Northeast Gateway)
  - F. Freeport, TX: 1.5 Bcf/d (Cheniere/Freeport LNG Dev.)★
  - G. Sabine, LA: 4.0 Bcf/d (Cheniere/Sabine Pass LNG)★
  - H. Hackberry, LA: 1.0 Bcf/d (Santos - Cameron LNG)
  - I. Offshore Boston, MA: 0.4 Bcf/d (GDF SUEZ - Neptune LNG)
  - J. Sabine Pass, TX: 2.0 Bcf/d (ExxonMobil - Golden Pass) (Phase I & II)
  - K. Pascagoula, MS: 1.5 Bcf/d (El Paso/Crest/Sonangol - Gulf LNG Energy LLC)
  - L. Peñuelas, PR: 0.3 Bcf/d (EcoElectrica)

- **Canada**
  - M. Saint John, NB: 1.0 Bcf/d (Repsol/ForEx Change - Canesport LNG)

- **Mexico**
  - N. Altamira, Tamaulipas: 0.7 Bcf/d (Shell/Total/Mitsui - Altamira LNG)
  - O. Baja California, MX: 1.0 Bcf/d (Sempra - Energia Costa Azul)
  - P. Manzanillo, MX: 0.5 Bcf/d (KMS GNL de Manzanillo)

**Export Terminals**

- **U.S.**
  - B. Cove Point, MD: 0.82 Bcf/d (Dominion - Cove Point LNG) (CP12-113)
  - G. Sabine, LA: 2.9 Bcf/d (Cheniere/Sabine Pass LNG - Trains 1, 2, 3 & 4)
  - Q. Kenai, AK: 0.2 Bcf/d (ConocoPhillips)

★ Authorized to re-export delivered LNG
North American LNG Import/Export Terminals
Approved

Import Terminals

U.S.
APPROVED - UNDER CONSTRUCTION - FERC
1. Corpus Christi, TX: 0.4 Bcf/d (Cheniere – Corpus Christi LNG) (CP12-507)
APPROVED – NOT UNDER CONSTRUCTION - FERC
2. Salinas, PR: 0.6 Bcf/d (Aguirre Offshore GasPort, LLC) (CP13-193)
APPROVED - NOT UNDER CONSTRUCTION - MARAD/Cost Guard
3. Gulf of Mexico: 1.0 Bcf/d (Main Pass McMCaRe Exp.)
4. Gulf of Mexico: 1.4 Bcf/d (TOPP Technology Bienville LNG)

Export Terminals

U.S.
APPROVED - UNDER CONSTRUCTION - FERC
5. Hackberry, LA: 2.1 Bcf/d (Sempra – Cameron LNG) (CP13-25)
6. Freeport, TX: 2.14 Bcf/d (Freeport LNG Dev/Freeport LNG Expansion/FLNG Liquefaction) (CP12-509) (CP15-518)
7. Corpus Christi, TX: 2.14 Bcf/d (Cheniere – Corpus Christi LNG) (CP12-507)
9. Elba Island, GA: 0.35 Bcf/d (Southern LNG Company) (CP14-103)

APPROVED - NOT UNDER CONSTRUCTION - FERC
10. Lake Charles, LA: 2.2 Bcf/d (Southern Union – Lake Charles LNG) (CP14-120)
11. Lake Charles, LA: 1.08 Bcf/d (Magnolia LNG) (CP14-347)
12. Hackberry, LA: 1.41 Bcf/d (Sempra - Cameron LNG) (CP15-560)
13. Sabine Pass, TX: 2.1 Bcf/d (ExxonMobil – Golden Pass) (CP14-517)

Canada
APPROVED – NOT UNDER CONSTRUCTION
CN1. Port Hawkesbury, NS: 0.5 Bcf/d (Bear Head LNG)
CN2. Kitimat, BC: 3.23 Bcf/d (LNG Canada)
CN3. Squamish, BC: 0.29 Bcf/d (Woodfibre LNG Ltd)
CN4. Prince Rupert Island, BC: 2.74 Bcf/d (Pacific Northwest LNG)

★ Trains 5 & 6 with Train 5 under construction

US Jurisdiction
- FERC
- MARAD/USCG

As of July 2, 2018
Where is it going by ship (2018)?

South Korea 18%
China 15%
Japan
Turkey
Spain
Jordan

US Export Capacity
3.6 Bcf/d now
9.6 Bcf/d by 2019

3rd largest exporter by 2020, behind Australia and Qatar
What will exports do to price???

Industrial Energy Consumers of America

From July 27, 2018 Comments to US DOE

“When we export natural gas, we are lowering the cost of natural gas to our manufacturing competitors in other countries and increasing our domestic costs – a double negative impact. You are making it harder for us to compete, invest capital, and create high paying middle class jobs.” (emphasis added)

“In 2017, according to the Bureau of Labor Statistics (BLS), the oil and natural gas industry employed 512,100 jobs. The manufacturing sector employs 12,713,000 jobs. Of that total, energy-intensive trade-exposed industries (EITE) (IECA members) that would be most affected by LNG exports employ 5,125,600 employees. The point is – that you could double or triple the number of people employed by the oil and gas industry due to LNG exports and it is still a small job creator. But, if the DOE gets this wrong and approves too many export terminals and natural gas prices rise, DOE puts at risk trillions of dollars of manufacturing assets and over 12.7 million jobs.” (emphasis added)
Navigating the EIA Website
Navigating the EIA Website
Navigating the EIA Website
Navigating the EIA Website
Navigating the EIA Website
Navigating the EIA Website
Questions?????

www.upstateforever.org

Archive: www.upstateforever.org/pipelines-101
Thank you!

Shelley Robbins
srobbins@upstateforever.org