The Outlook For Pipeline Construction

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National Association of Pipe Coating Applicators

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EXCELLENT
CONSTRUCTION OUTLOOK:
A FUNCTION OF MANY FACTORS

- SUPPLY
- DEMAND
- COMPETITION
- EXISTING INFRASTRUCTURE
- ECONOMY
- PIPELINE SAFETY
- politics
SUPPLY
SHALE FORMATIONS OF THE U.S.

Source: Modified from Schlumberger presentation, 2005
Shale formations are widely distributed.

Liquids content vary by location, which affects the economics of development.

Source: NEB, “Understanding Canadian Shale Gas,” 2009
SHALE FORMATIONS OF THE U.S.

Source: Energy Information Administration based on data from various published studies.
Updated: May 9, 2011
PRODUCTION OUTLOOK

1EIA. Annual Energy Outlook 2012. (Page 3)
SHALE ASSESSMENTS BY YEAR
(TCF RECOVERABLE)
DEMAND

- Power Generation
- Manufacturing: Ammonia Plants; Methanol plants; GTL; Direct Reduced Iron Plants; Ethylene Plants; Propane Dehydration; Propane and Butane Export
  - Long-term contracts
- Strategic –Sustainability
- US Governors—a NGA 2013 agenda priority
- Cleaner Air
Anticipated Growth in Electric Generation

COMPETITION

- RENEWABLES - Energy Sprawl
- NUCLEAR
- COAL – Expected plant Shutdowns
NATURAL GAS: POTENTIAL TO LEAD ECONOMIC RENAISSANCE

Change in CME Monthly Settlement Prices Since January 2007

Source: CME Group, A CME/Chicago Board of Trade Company
EXISTING INFRASTRUCTURE

Source: Interstate Natural Gas Association of America, Pennwell MapSearch
2011 PROJECTED CHANGES IN GAS FLOWS (2010 - 2020)

Inter-regional Natural Gas Pipeline Flows
(Change from 2010 to 2020 in MMcfd)

Gray lines indicate increased pipeline flows
Red lines indicate decreased pipeline flows
Blue lines indicate changes in LNG flows

Source: ICF 2011
2013 SUPPLY AND DEMAND CHANGES WILL SIGNIFICANTLY CHANGE PIPELINE FLOWS OVER THE NEXT 10 YEARS

- Increases in flows from the Gulf Coast to the east are due to increases in Mid-continent shale gas production.
- Modest increases in the Rockies both east and west.
- Marcellus gas production growth displaces gas flows into the U.S. Northeast (shifts within the Northeast are not depicted on this interregional flow map).
- Declining conventional production in Alberta and increasing gas consumption for oil sands development causes flows from western Canada to decline.

Source: ICF International
PROVEN TRACK RECORD OF BUILDING PIPELINE INFRASTRUCTURE
16,000 MILES IN 10 YEARS

Major Pipeline Projects Certificated
January 2000 – February 2010

Colorado Corridor
23 Projects
29 Certificates
12,930 MMcf/d

New England Corridor
22 Projects
31 Certificates
9,773 MMcf/d

Ruby Pipeline
(1,456)

Fayetteville Corridor
12 Projects
23 Certificates
20,240 MMcf/d

East Texas Corridor
18 Projects
22 Certificates
22,125 MMcf/d

115.00 Bcf/d Total
16,178 Miles

Source: FERC, Office of Energy Projects
Sources: Derived from Ventyx Velocity Suite, the C Three Group’s U.S. Electric Transmission Database and FERC’s Transmission Database
IMPACT OF MARCELLUS PRODUCTION GROWTH ON REGIONAL FLOWS (2012-2025)

Change in Average Annual Flows (MMcf/d)

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ECONOMIC CONTRIBUTIONS THROUGH 2035

Upstream Capital Expenditures (SHALE): $1,654 Billion
[ANGA -2011]

Natural Gas Midstream Infrastructure Requirements: $ 205 Billion
[INGAA FOUNDATION/ ICF 2011]
GAS PRICE STABILITY
As supply grows, price remains low, stable

Lower 48 gas supply has grown by 20 Bcfd since 2000, up 50%
ECONOMIC BENEFITS OF GAS ABUNDANCE

“Lower utility costs have saved U.S. companies and consumers an average of $566 million a day\(^1\). = $203B

—Bank of America Merrill Lynch study on benefits of low natural gas prices

“Savings from lower gas prices will add an annual average of $926 per year in disposable household income between 2012 and 2015

—IHS Global Insight study on economic contributions of shale gas

“By 2025, the $11.5 billion U.S. manufacturers are projected to save annually by burning gas should allow them to make other investments and create as many as a million more jobs.”

—Robert McCutcheon, the U.S. industrial products leader at PriceWaterhouse Coopers\(^3\).
SAFETY
GUIDING PRINCIPLES OF PIPELINE SAFETY

- Our goal is ZERO incidents
- We are committed to safety culture
- We will be relentless in our pursuit of improving
- We are committed to applying integrity management principles on a system-wide basis
- We will engage our stakeholders
APPLY RISK MANAGEMENT BEYOND HIGH CONSEQUENCE AREAS (HCAS)
APPLY RISK MANAGEMENT BEYOND HCAS

Estimated statistics based on survey results:

• 5 million people reside near our pipelines (200,000 miles)

• 100% of population lives near 33% of pipeline (67,000 miles)

• 64% of the 5 million people live in HCA (8,000 miles)

• 128,000 miles have been assessed (64%)

• 89% of total population live near these assessed pipelines
**IM expansion will drive more program & physical work:**

- **Phase 1:** 90% of nearby population using IM principles by 2012

- **Phase 2:** 90% of the population nearby pipelines using ASME B31.8S by 2020 – **128,000 miles**

- **Phase 3:** 100% of the population nearby pipelines using IM principles by 2030 – **32,000 miles**

- **Phase 4:** The remaining ~20% of mileage with no population using IM principles beyond 2030 – **40,000 miles**

*tool runs, pipeline modifications, pipeline repairs/replacements/testing,…*
DEMONSTRATE FITNESS FOR SERVICE ON PRE-REGULATION PIPELINES
DEMONSTRATE FITNESS FOR SERVICE ON PRE-REGULATION PIPELINES

Where records to establish MAOP are inadequate or pipe is untested, INGAA members will apply Fitness for Service (FFS)

*FFS methodology will drive need for more physical work…*

- 125,000 miles of pre-regulation pipe – records review ongoing

- Potential FFS process for these miles could lead to:
  - Pressure test
  - Pressure reduction
  - Pipe replacement
  - Use of alternative in-line inspection
  - Repair, replace or status quo

*Technology development, tool runs, pipeline modifications, pipeline repairs/replacements/testing,…*
SHORTEN PIPELINE ISOLATION & RESPONSE TIME TO 1 HOUR IN POPULATED AREAS
SHORTEN PIPELINE ISOLATION & RESPONSE TIME

Recent survey representing ~70% of INGAA mileage:

- 29,800 valves total – 5,000 already automated – 17%

And for >12” in populated areas:

- 5,900 valves – 1,800 already automated – 31%

Valve automation, communication, actuators, etc,…
politics
SITUATION: GRIDLOCK

- I warned them political parties would be our ruin.
- Time for another revolution?
- A house divided against itself...
- Don't say it, Abe.

Closed until further notice.
WHITE HOUSE PRIORITIES

- Budget and Deficit
- Gun Control
- Immigration
- Domestic Energy
- Cybersecurity

Could be Natural Gas Pipeline Issues

Source: Jay Carney, 3/11/13
CONGRESSIONAL PRIORITIES

- Budget and Deficit
- Domestic Energy
- Cybersecurity

Could be Natural Gas Pipeline Issues
DOMESTIC ENERGY

- Natural gas production
- LNG exports
- Pipeline permitting
Energy secretary nominee Ernest Moniz backs increased use of natural gas
PIPELINE CONSTRUCTION:
THE NUMBERS
INFRASTRUCTURE NEEDED- [2011]

- The US and Canada will require midstream natural gas investment of $205.2 billion over next 25 years ($8.2 billion per year).

- New infrastructure will be required to move natural gas from regions where production is expected to grow and to areas where demand is expected to increase.

- Natural gas consumption expected to grow 1.6% per year

- Total natural gas use expected to rise to about 109 Bcf/d

Source: The INGAA Foundation
Roughly 29 Bcfd of incremental pipeline capacity is built from 2011 to 2020 and from 2021 to 2035 an additional 14 Bcfd is built. A total of 43 Bcfd of incremental pipeline is needed to accommodate increasing gas supply that is necessary to satisfy market needs over time. Note that these maps do not generally show intra-regional pipeline expansions such as those that occur within the Marcellus shale production area.
Most new pipe (about 16,500 miles) is gathering line, which is generally smaller diameter pipe that is planned for and financed as part of upstream project development.

An average of almost 2,000 miles of new transmission line are added each year, which is well within the range of recent years. Roughly 1,400 miles per year are mainline miles, while about 600 miles per year are for lateral connections to power plants, processing plants, and other facilities.

Source: The INGAA Foundation-2011
THE INGAA FOUNDATION, INC.

THE U.S. HAS THE INFRASTRUCTURE TO SUPPORT LNG EXPORTS
DETAILS FROM 2011 INGAA FOUNDATION REPORT:
MIDSTREAM INFRASTRUCTURE REQUIREMENTS FOR OIL AND NATURAL GAS LIQUIDS
MAJOR NGL FLOW PATTERNS 2035

Natural Gas Liquids Shipments
2010 to 2035 Change in Flow (1,000 BPD)

5/24/2011
NGL PIPELINE INFRASTRUCTURE

- Significant pipeline expansions and new pipelines to accommodate growing NGL production:
  - Gulf Coast,
  - West Texas, and
  - Oklahoma.

- Other areas for new NGL pipeline capacity:
  - Marcellus & Utica,
  - Bakken, and Niobrara.
  [Roughly 80 percent of the new NGL infrastructure]

- ~2 million barrels per day of new NGL transmission lines -- 2010 and 2035.
Major Crude & Condensate Flow Patterns 2010
Major Crude & Condensate Flow Patterns 2035
OIL PIPELINE INFRASTRUCTURE

• Building new pipelines to deliver oil from Western Canada to the refineries of the Central US and Gulf Coast is expected to continue.

• Over 5 Million Barrels per Day of new oil transmission capacity will be required. Also, reversing capacity on some existing oil pipes where changes in supply sources affect oil movement patterns.

• Current and pending projects will increase capacity from western Canada by 1.3 Million Barrels per day.

• Significant pipe capacity is also built to the Pacific Coast to facilitate exports from ports in British Columbia.

• Additional oil pipeline capacity is also built out of the Rockies.
ENVIRONMENTAL GROUPS FOCUSING ON MIDSTREAM

PRUDENT NEEDED
SUMMARY
CONCLUSIONS [The April 2011 ICF Reference Case]

- **Significant Gas Market Growth**: power sector gas use doubles
- **Significant Infrastructure Needed** to support growing long run demand in many regions including the Southeast, Northeast, Southwest and Canada.
- **Significant supply development and growth in gas production**. Shale plays with large quantities of oil and natural gas liquids, which have needs for new pipeline infrastructure.
- **Gas prices that rise from $4 per MMBtu in real terms to between $6 and $7 per MMBtu in the longer-term**.
- **ICF Reference Case represents a “middle of the road” case**. A variety of variables could change and result in more or less gas growth.
Midstream Infrastructure Development

From 2010 through 2035 approximately:

- **1,400 miles per year of new gas transmission mainline.**
- **550 miles per year of new laterals** power plants, processing facilities, and storage fields.
- **16,500 miles per year of new gathering line.**
- **800 miles per year of new oil transmission line.** [+5MMBpd]
- **500 miles per year of new NGL transmission line.** [+2MMBpd]
CONCLUSIONS (continued)

- Expenditures are significant
- One-third of the mainline infrastructure requirement will be for oil and NGL pipelines.
- Future market growth and supply development hinges on uncertain assumptions

- CONTINUING CHANGE =
  - NEED FOR INFRASTRUCTURE UPDATE

- OUTLOOK = EXCELLENT
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