US Shale Production and Infrastructure
New Orleans, Louisiana

Gus Vasquez
8 November 2012
Agenda

- Argus background
- The Bakken play
  - Current production
  - Trends and forecasts
- Eagle Ford
  - Pipelines
  - Waterborne
  - Rail
- Conclusions
Who is Argus?

- Report prices in all world markets for
  - Crude and Refined products
  - NGL & LPG
  - Coal and coke
  - Gas
  - Power
  - Fertilizers
  - Petrochemicals
  - Emissions
- More than 400 staff globally with numerous offices
- Rapid growth in spot and term contract indexation, swaps market indexation
Bakken and Eagle Ford Production
Shale production

Sources: Texas Railroad Commission, North Dakota Oil and Gas Division, Montana Board of Oil and Gas

Illuminating the markets
Increasing production and mobility

- Bakken crude production has more than doubled over the past 2 years
- While initially constrained, Bakken crude now reaches all corners of the US
  - Railing to west and east coasts increased markedly
  - Pipeline expansions and additions continue
- Demand for Bakken has increased along with its ability to move
  - Refiners in the east and west coasts have committed to taking the grade
Bakken production

Source: North Dakota Department of Mineral Resources, Montana Board of Oil and Gas, Saskatchewan Ministry of the Economy

Illuminating the markets
Eagle Ford production

• Total crude production eclipsed 350,000 b/d
  ◦ Forecasts pin 2017 liquids production ~1.6mn-2mn b/d
  ◦ Oil trends extremely light, much of it condensate
  ◦ But condensate share waning in favor of crude

• Moving by pipeline
  ◦ Valero’s 90,000 b/d refinery at Three Rivers
  ◦ Corpus Christi/Houston/Texas city refining complexes

• Railed to St James and barged to entire USGC

• By Jones Act tankers
  ◦ Delaware Bay refining complex
Eagle Ford Liquids Production

Source: Texas Railroad Commission

Illuminating the markets
Bakken Takeaway Projects
Projects move forward

- Plans remain in place for several pipelines out of the Bakken
  - Some 1.6mn b/d of capacity in place by 2015
- But rail will continue to play an important role
  - Around 730,000 b/d capacity now
  - By 2015 expected to reach 880,000 b/d
- Talk that the USGC may cease to be an economic option for Bakken
- Could see volumes limited to just East and West coasts in future
Enbridge North Dakota pipeline project

- Currently 210,000 b/d capacity including 25,000 b/d expansion in 2011
- Will add 120,000 b/d of oil capacity in early 2013
- Will take oil to a connection with Enbridge’s mainline system in Cromer, Manitoba

Source: Enbridge

Illuminating the markets
Plains Bakken North Pipeline

- Starting at Trenton, ND and connecting to Wascana Pipeline System
- 50,000 b/d initial capacity, expandable to 75,000 b/d
- Construction to be completed by end-2012
- Operational early 2013
High Prairie Pipeline

- Beginning near Alexander, ND and end near Clearbrook, MN
  - Interconnect with Enbridge and Minnesota Pipelines near Clearbrook
- 150,000 b/d capacity
- Completion expected 4Q 2013
  - Subject to approvals, long-term commitments and ability to interconnect
  - Currently High Prairie has filed a complaint against Enbridge as it refused an interconnection
Oneok Bakken Crude Express project

- From Stanley, ND to Cushing, OK
- Construction starting in 2014, completion by mid-2015
- 200,000 b/d initial capacity
- Binding open season will conclude 20 November
  - Won’t proceed without long-term commitments
Rail projects

- Enbridge Berthold
  - 80,000 b/d capacity by early 2013
  - Can hold up to 3 unit trains
  - Bridger Logistics shipped first unit train in September
    - 10,000 b/d currently, 30,000 b/d by next year

- Plains Ross
  - In service with 20,000 b/d
  - Unit train capability by 4Q12 - rise to 65,000 b/d

- US Development Group Van Hook
  - Currently 35,000 b/d but 65,000 b/d by late 2012
Analysis of growing onshore rail market

BAKKEN RAIL RATES

North Dakota origination

<table>
<thead>
<tr>
<th>City</th>
<th>Rate ($)</th>
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<tbody>
<tr>
<td>Denver</td>
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<tr>
<td>Tulsa</td>
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<tr>
<td>Chicago</td>
<td>0.93</td>
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<tr>
<td>Bakersfield, CA</td>
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<td>New York</td>
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RAIL TANK CAR LEASE RATES

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<th>Rail tank car type</th>
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<th>Nov Railcar only ($/car/month)</th>
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<td>Non-pressurized</td>
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<tr>
<td>Pressurized</td>
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Illuminating the markets
Argus Petroleum Transportation North America

- Insight into constantly changing transportation issues
- Railing, barging, pipeline and waterborne
- Route rates for crude/NGL/refined products/biofuels
- Infrastructure news
- Maps/Analysis
- Arbitrages

**US light crude exports approach judgment day**
The onslaught of US light, sweet crude – particularly along the Gulf Coast – leaves sweeters in sweet spots, whereas their domestic refiners reach the limit in what they can blend with their usual feedstock slate. The result could be a glut of crude so sweet that it can be used, or a shift from heavy grades back to the lighter fuel of bygone days.

But there is another option, one unthinkable to a nation dependent on foreign crude – overseas exports. “What should be done is to sell the light crude to markets that want light crude,” Hans All American Pipeline chief executive Greg Armstrong told Argus this week, echoing US independents Marathon Oil and Pioneer Natural Resources. The possibility was even raised by the US Energy Information Administration (EIA) this summer.

The US lifts its export ban, and the small amount allowed to leave US borders either flows to Asia from Alaska or north to Canada. Otherwise, producers must find domestic markets, or it remains no one seeing or new price signals create they will take, meaning discounts will slow drilling without another outlet.

**US Gulf coast imports have gotten markedly heavier**, Energy Information Administration (EIA) data show. Gravity that averaged 28.5 API in 1999 and stayed around 28 API for the last decade started to dive in 2010 as light crude from Africa took the Eagle Ford shooks out of play. There is a rush to import similar west African supplies. Now, imports average 24.5 API.

The first wave of Eagle Ford production began landing at regional refiners in large quantities last year. Supplies then found their way farther up the coast. In May, refinery crude shipments out of the Port of Corpus Christi jumped by nearly 2 million b/d to more than 3 million.

Since then, outbound shipments have grown by around 1 million b/d each month through August, when they totaled 5.7 million b/d. Barge traffic to other US Gulf ports accounted for the surge, and new Jones Act-compliant tankers to the US east coast are adding volumes.

The result means a dilemma for the next US administration. Export a politically charged commodity, or risk a decline in drilling and the jobs that go with it.

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**Commodity news**

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<th>Location</th>
<th>Grade</th>
<th>Unit</th>
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<tbody>
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<td>S/B</td>
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<td>ULS crude</td>
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<td>URW crude</td>
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<td>Ethanol</td>
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- Rail tanker car lease rates 15
Eagle Ford Takeaway Projects
Projects galore in the Eagle Ford shale

- About 2mn b/d of liquids takeaway capacity is planned for the region
- Most of it is under construction or is in service already
- Question on infrastructure remains: How much is too much? Or too little?
Enterprise Products Partners-Plains All American

- Long-term commitments of 210 MBPD
- Targeted capacity of 350 MBPD
- Initial base tariff rate of $1.25/Bbl from Gardendale to all destinations

140-mile Gardendale to Corpus Christi pipeline: construction in progress; expected in-service 2Q 2013

35-mile Three Rivers to LyssyPipeline: expected in-service 1Q 2014

Source: Enterprise Products Partners
Enterprise and Plains join forces

• Consolidated projects in August
  o Include 350,000 b/d crude/condensate pipeline
  o Total operational storage of 1.8mn bl

• Two prongs at Three Rivers
  o Legacy Plains project to Corpus Christi marine terminal
  o Plains building 80,000 b/d condensate stabilization facility at Gardendale
  o Legacy Enterprise project to connect to existing 350,000 b/d pipeline at Lyssy
  o Enterprise’s Lyssy-Houston pipeline on line this summer
    - connects to existing Rancho pipeline, which reaches Houston-area refineries and the new Echo terminal

Illuminating the markets
Kinder Morgan’s crude and condensate line

- KMCC on line with 300,000 b/d of capacity
  - From DeWitt County to Houston area
  - Originates in Eagle Ford’s condensate window
  - Includes 113 miles of converted gas pipeline
- Variety of destinations
  - To refineries and Oiltanking’s 12.1mn bl storage terminal east of Houston
  - Kinder Morgan’s 19mn bl facility in Pasadena
  - Also can reach region’s petrochemical plants
  - Feed Kinder Morgan’s planned condensate facility at 7.5mn bl Galena Park terminal
Harvest pipeline

- Multiple lines
- 350,000 b/d
- Main Pearsall line to Corpus Christi
  - Will rise 20,000 b/d to 90,000 b/d in December
- New Gardendale pipeline follows Pearsall path
  - Capacity: 160,000 b/d in December
  - Expandable to >250,000 b/d by mid-2013
NuStar Energy

Source: NuStar Energy

Illuminating the markets
NuStar Energy

• Dual lines - Gardendale to Oakville, near Three Rivers
  - TexStar and Velocity systems will bring up to 100,000 b/d each

• NuStar’s reversed 200,000 b/d pipe from Oakville to Corpus Christi
  - NuStar’s 2mn bl North Beach site
    - Can move 200,000-400,000 b/d out by barge
  - Shell, Chesapeake Energy, SM Energy and Rosetta Resources will move condensate
  - NuStar also has reversed a 38,000 b/d line to Corpus Christi
Koch Pipeline/Flint Hills Resources

- Up to 280,000 b/d from Pettus to Corpus Christi
  - New 250,000 b/d pipeline
  - Fed in part by 120,000 b/d line from new truck terminal at Helena

- Multiple destinations at Corpus Christi
  - Flint Hills’ 300,000 b/d refinery
  - Koch’s 2.6mn bl terminal at Ingleside
    - has 200,000 b/d outbound waterborne capacity
Other systems

- Trafigura/Energy Transfer Partners
  - 100,000 b/d pipeline from multiple points in Eagle Ford
  - Pipeline ends at trading firm’s 600,000 bl Texas Dock & Rail terminal at Corpus Christi

- US Development Group
  - Unit train terminal at Gardendale
  - Can ship 40,000 b/d of crude or condensate to the hub at St James, Louisiana
  - Can unload 15 incoming tanker trucks simultaneously

Illuminating the markets
Enterprise ECHO terminal

- 4.5mn bl crude storage in 2Q 2012 in Houston
  - High storage demand prompting expansion to up to 6.5mn bl
  - Will receive 350,000 b/d from Eagle Ford
  - Will link to Seaway pipeline by mid-2013
  - Will connect to Morgan’s Point dock, allowing crude barging

Source: Seaway Crude Pipeline Company
Argus Eagle Ford transportation assessments

- Argus assesses prompt-month barge rates from Corpus Christi to six destinations in Texas and Louisiana
- Argus also is assessing Jones Act-compliant tanker rates from Corpus Christi to the US Atlantic coast refining complex
Argus assessing Jones Act dirty tanker market

- East coast refiners appear serious about branching into Eagle Ford crude
- Jones Act tankers most affordable, direct way to get it there from Texas
- Producers beginning to discuss exports as output grows and potential destinations shrink

Illuminating the markets
Conclusions
Conclusions

- For Eagle Ford, at least 2.1mn b/d of pipeline and rail capacity in place, under construction or proposed
- For Bakken, close to 1.3mn b/d in pipeline capacity on line and as much as 730,000 b/d rail capacity
- Potential for an infrastructure overcapacity
  - Eagle Ford more of a concern
  - North Dakota expected to have capacity of almost 2.5mn b/d of rail and pipeline capacity by 2015
Conclusions

- Potential for a light, sweet bottleneck on the Gulf coast as refiners reach capacity
  - Foreign lights already pushed out
- Production and future movements will remain uncertain
- Waterborne exports of light sweet crude already a topic of conversation
  - EIA’s Administrator publicly discussed need for exports
  - But political and public opposition is likely
Any questions?
Gus Vasquez
Editor, Argus Americas Crude
Email: gustavo.vasquez@argusmedia.com
Phone: 713-968-0014