Key Questions

- Is N.A. shale/tight oil expansion sustainable?
- What are the main challenges to N.A. shale/tight oil expansion?
- What has been the evolution of N.A. shale/tight oil production?
- What are the collateral effects of N.A. shale/tight oil production?
- Is N.A.’s shale/tight oil experience replicable abroad?
Drivers for NA Liquids

- Price differential between WTI crude oil and Henry Hub natural gas remains elevated.
- Independents moving rigs to “oiler plays;” majors continue drilling dry gas plays.
- Prices for the NGL basket held up until last year.
- Success of the Bakken/Three Forks play.
North Dakota Pipeline Authority, “N.D. Oil Transportation Infrastructure”
NA Liquids Production Sustainable

TODAY = 789K b/d

Hart Energy’s North American Shale Quarterly, 4Q2012
WILLISTON BASIN (NORTH DAKOTA) LIQUIDS PRODUCTION

Hart Energy’s North American Shale Quarterly, 4Q2012
WILLISTON BASIN (MONTANA) LIQUIDS PRODUCTION

Hart Energy’s North American Shale Quarterly, 4Q2012
Challenges to Shale/Tight Oil Production?

- Prices for the NGL basket are starting to fall; only natural gasoline has increased.
- Not every play is going to be like the Bakken.
- Federal regulatory issues could impact the industry.
- Lower forecasted WTI prices given oversupply of liquid sweet crude into PADD 3 refining & lack of export opportunity.
Challenges to Shale/Tight Oil Production?

WTI | NGL | NATURAL GAS AVERAGE ANNUAL PRICES

Source: Hart Energy Research, Bloomberg data

Hart Energy’s Refining Unconventional Oil, 2013
Challenges to Shale/Tight Oil Production?

HART ENERGY WTI CUSHING CRUDE OIL PRICE FORECAST

Evolution of NA Liquids-Rich Plays

Evolution of NA Liquids-Rich Plays

EAGLE FORD UNCONVENTIONAL LIQUIDS PRODUCTION

Hart Energy’s North American Shale Quarterly, 4Q2012
Evolution of NA Liquids-Rich Plays

PERMIAN BASIN UNCONVENTIONAL LIQUIDS PRODUCTION

Hart Energy’s North American Shale Quarterly, 4Q2012
Evolution of NA Liquids-Rich Plays

Weighted Average Breakeven Prices for Major Plays

- Permian
- Utica
- Niobrara
- Eagle Ford
- Bakken
- Cardium
- Alberta-Bakken

Hart Energy’s North American Shale Quarterly, 4Q2012
Impact on N.A. Crude Oil Production

NORTH AMERICA SHALE/TIGHT OIL PRODUCTION

Hart Energy’s North American Shale Quarterly, 4Q2012
Impact on N.A. Crude Oil Production

NORTH AMERICA SUPPLY/DEMAND BALANCE

Collateral Effects of N.A. Shale/Tight Oil Production

U.S. REGIONAL CRUDE OIL PRICE BENCHMARKS

Hart Energy’s Refining Unconventional Oil, 2013
Collateral Effects of N.A. Shale/Tight Oil Production

Estimated Global Landed LNG Prices
July 2012, US$/MMBtu

Source: FERC Waterborne Energy, Hart Energy Research
"Refining Unconventional Oil"

Hart Energy’s Refining Unconventional Oil, 2013
Collateral Effects of N.A. Shale/Tight Oil Production

NORTH AMERICA CRUDE BALANCE LESS PRODUCT EXPORT
(‘000 barrels per day)

<table>
<thead>
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<th>SUPPLY</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2020</th>
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<tr>
<td>Crude Oil Production</td>
<td></td>
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<tr>
<td>Canada</td>
<td>3340</td>
<td>3460</td>
<td>3650</td>
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<td>7500</td>
<td>8040</td>
<td>8540</td>
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<tr>
<td>Subtotal</td>
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<td>11690</td>
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<table>
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<tr>
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<tbody>
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<td>Refinery Input</td>
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<td>21100</td>
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<tr>
<td>Net Crude Requirement</td>
<td>6470</td>
<td>10140</td>
<td>9410</td>
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<td>Refined Product Imports</td>
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<td>-940</td>
<td>-1040</td>
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<td>Net Dependence</td>
<td>5640</td>
<td>9200</td>
<td>8370</td>
<td>3320</td>
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</tbody>
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N.A. Shale/Tight Oil Replicable Abroad?

Foreign E&P Companies Acreage Positions in North America

Hart Energy’s Global Shale Service, July 2013
N.A. Shale/Tight Oil Replicable Abroad?