Technical Session Agenda
2016 SPEE Annual Meeting

Monday, June 6, 2016

10:30 AM  Complete to Compete (The Impact of Enhanced Completions on Well Performance, Economics and Resource Potential)

Gibson Scott

BIOGRAPHY
Gibson Scott – RS Energy Group, CFA, Executive Director

Gibson became a member of RSEG in June 2004 after working for two years in Talisman Energy’s land acquisitions and divestitures group. While at Talisman, Gibson was responsible for land contracts analysis, post-closing due diligence and systems integration. Gibson was raised in an oil services environment, having lived, studied and worked in six countries, with summers spent as an oilfield services mechanic in Nisku, Alberta. In 2002, Gibson graduated from the University of Western Ontario with a bachelor degree in administrative and commercial studies, specializing in finance and administration, and earned his CFA charter in 2009. Gibson is a frequent presenter at industry conferences and a team lead on consulting/advisory projects.

Areas of Focus: Bakken, Niobrara, Miss Lime, and company/asset valuations.
Introduction

18 Years of Trusted Energy Research

1998
Ross Smith Energy Group
Introduced independent, technically driven investment research

2011
ITG Investment Research
RSEG acquired by ITG. Solidified our position as a premier independent Energy Research and Advisory firm in North America

2016
RS Energy Group
The Energy Research team will again be an independent company financed by Warburg Pincus to expand the research and advisory offering
WTI Prices and Rig Activity

Lower Activity for Lower Prices
Relative Completions Intensity
Lateral Lengths and Proppant Intensities Climbing

Source: RSEG, raw data provided by Drilling Info Inc.
Big 4 Lateral Lengths

Longer Laterals for Lower Prices

Source: RSEG, EIA, Texas RRC, NDIC
Big 4 Proppant Intensities
Larger Completions for Lower Prices

Source: RSEG, EIA, Texas RRC, NDIC
Key Performance Inputs
What Drives Change?

- Well Costs
- Operating Costs
- Completion Design
- Lateral Length
- Location High Grading

EURs and Well Economics
Methodology
L48 Breakdown
Organizing the Data
L48 Landscape
Wells and Plays Analyzed
L48 Landscape
Hydrocarbon Mix by Play
Performance
L48 Landscape
Normalizing for Geology

Source: RSEG
EURs – 2012
The Way Things Were
L48 Landscape
Inter-well Spacing

Source: RSEG, raw data provided by Drilling Info, Inc. and state agencies
Williston Basin Density Pilots
Even Mature Basins Have A Lot of **Running Room**
EURs – Normalized for Geology and Lateral Length

No Change from Spacing
L48 Landscape

Proppant Intensity

Source: RSEG, raw data provided by Drilling Info, Inc. and state agencies
Williston Basin Proppant Intensity

Ramping Up … Slowly

Source: RSEG, EIA, Texas RRC, NDIC
Eagle Ford Proppant Intensity
Stabilizing Around 1,700 lbs/ft

EAGLE FORD EAST (200-well MA)
EAGLE FORD WEST (200-well MA)

Source: RSEG, EIA, Texas RRC, NDIC
Permian Proppant Intensity
Delaware Overtaking Midland

Source: RSEG, EIA, Texas RRC, NDIC
EURs – Normalized for Geology and Lateral Length Change Due to Proppant Intensity

Source: RSEG
L48 Landscape

Lateral Length

Source: RSEG, raw data provided by Drilling Info, Inc. and state agencies
Williston Basin Lateral Lengths

Steady Since 2013

Source: RSEG, NDIC Complete to Compete | 24
Eagle Ford Lateral Lengths

Steady in the East; **Growing in the West**

Source: RSEG, EIA, Texas RRC, NDIC
EURs – Normalized for Geology and Lateral Length Change Due to Lateral Length
Core Horizontal Rig Index
Industry Retreating to Core in Every Basin

Breakeven Percentiles:
Core = 25th percentile
Tier 1 = 50th percentile
Tier 2 = 75th percentile

Source: RSEG

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Rig-Weighted Average Breakevens
High-Grading and Deflation Driving Better Economics

Play Average Breakeven WTI ($/bbl) Through Time

Horizontal Rigs

Current EUR Rig-Weighted Breakeven WTI ($/bbl)

Source: RSEG

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EURs – Normalized for Geology and Lateral Length Change Due to High-Grading

Total Change in EUR
39% 15% 17% 40% 20%

Source: RSEG Complete to Compete | 31
Costs
AFE Cost Analysis

Available AFEs Indicate Declining Costs

Source: RSEG, raw data provided by Drilling Info Inc.
NFX STACK AFEs (2014-2015)

Drill Costs Down 30%; Completion Costs Down 18%

Change in NFX STACK AFE Well Costs from 2014 to 2015

Average NFX STACK AFE Well Cost

Source: RSEG, raw data provided by Drilling Info Inc.

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Williston Basin Guided Well Costs
Expecting Further Reductions

Guided D&C CAPEX/well ($MM/well)

Source: RSEG, raw data provided by Drilling Info Inc.
### Williston Basin MVR Analysis

#### Variability Around Each Mean Figure

**Source:** RSEG, raw data provided by Drilling Info Inc.

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**Notes:**
- **RSEG Est. D&C CAPEX/well ($MM/well)**
- **Variability Around Each Mean Figure**
Williston Basin MVR Analysis
Lower Well Costs for Every Operator
Eagle Ford Well Costs
Costs Falling Even as Intensity Rises

Source: RSEG, raw data provided by company reports, state agencies, Drilling Info Inc.
Lateral Normalized Permian Well Costs
Costs Coming Down Despite Bigger Completions

Source: RSEG, raw data provided by company reports, state agencies, Drilling Info Inc.
Economics
L48 Breakevens
Supply Cost Falling

Source: RSEG, raw data provided by company reports, state agencies, Drilling Info Inc.
L48 Breakevens
Supply Cost Falling

Source: RSEG, raw data provided by company reports, state agencies, Drilling Info Inc.

Change in Break-Even by Play

Change in L48 Break-Even

WH EUR 399 Mboe (31% oil)
WH EUR 433 Mboe (34% oil)
WH EUR 468 Mboe (39% oil)
WH EUR 487 Mboe (51% oil)
L48 Landscape
Breakeven Prices

Source: RSEG, raw data provided by company reports, state agencies, Drilling Info Inc.
Resource
L48 Landscape
Region and County Breakout

Source: RSEG, raw data provided by company reports, state agencies, Drilling Info Inc.
L48 Dispatch Curve
Rolling Up the Regions

Under $50 WTI and $2.50 NYMEX, RSEG estimates there is 108 Bbbl of oil and 324 Tcf of gas from 850 regions. After 15 years, those estimates fall by 12% to 94 Bbbl of oil and 286 Tcf of gas, under RSEG's base case forecast.

Remaining Resource 438 Bboe
Remaining Gas Resource 1,674 Tcf
Remaining Oil Resource 159 Bbbl

Source: RSEG, raw data provided by state agencies, Drilling Info Inc.
L48 Dispatch Curve
Rolling Up the Plays

Source: RSEG, raw data provided by state agencies, Drilling Info Inc.
Cumulative Remaining Locations

Oily Regions

Breakeven WTI ($/bbl)

Cumulative Wells Drilled To Date
Bakken Remaining Locations
Permian Remaining Locations
Eagle Ford Remaining Locations
All Other Remaining Locations
Years Of Inventory At 380 Rig Count

Source: RSEG, raw data provided by state agencies, Drilling Info Inc.
L48 Landscape
Resource Estimates and Breakevens

Source: RSEG, raw data provided by company reports, state agencies, Drilling Info Inc.
### Disclosures - Companies Mentioned

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<th>Company Name</th>
<th>Ticker</th>
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Valuation and Methodology
RSEG valuations are based primarily on calculations of net asset value (NAV), which are derived using discounted cash flow (DCF) models. The NAV model begins with an evaluation of a company’s proved developed reserves using industry-standard decline analysis. RSEG then assesses the company’s land holdings using a variety of technical data sources (geology, completion, historical production, etc.) to estimate the viability of the acreage for future drilling. Each well has an associated capital and operating cost structure that is incorporated into RSEG’s model, which also accounts for hedges, debt, taxes, general and administrative costs, and other corporate-level financial inputs. RSEG typically runs a number of sensitivities around key variables, such as well cost, reserves and commodity prices, to show the range of possible outcomes.