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# High Yield Energy

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See Appendix A-1 for Analyst Certification, Important Disclosures and non-US research analyst disclosures.

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This presentation was approved for distribution on 27 May 2016; the disclosures in Appendix A1 are current as of the same date.

# Sector Outlook – Energy

## Energy Sector View:

- We are Marketweight on the Energy sector (upgraded from Underweight on April 27). While we continue to expect further defaults and fallen angels, we believe the effects of these events are largely priced in. While the sector underperformed at the beginning of the year, reaching wides of 1525bp STW / \$51.73 / 16.4% YTW on 2/11, it is now up 16.5% YTD and 1.5% MTD, outperforming the overall index and is yielding 9.7% versus 7.5% for the Citi HYM Index.
- **E&P:** We continue to suggest that investors focus on asset quality and companies that can survive in a lower for longer commodity price environment
- **Midstream:** While there is uncertainty regarding volumes as well as the strength of midstream contracts in the face of a sustained lower commodity price environment, we continue to feel comfortable investing in diversified midstream companies with downstream exposure
- **Services:** We believe D&C services will remain competitive and utilization will remain low (below the level that gives servicers pricing power)

Citi Index Summary Levels As of 5/25	Price	YTW	OAS	MTD Return	YTD Return
<b>Total Exploration &amp; Production</b>	<b>\$77.43</b>	<b>12.28%</b>	<b>1087</b>	<b>4.8%</b>	<b>21.6%</b>
Exploration & Production - Corps	\$79.97	11.53%	1009	4.3%	25.2%
Exploration & Production - MLPs	\$29.10	43.04%	4175	14.4%	26.8%
<b>Midstream</b>	<b>\$96.85</b>	<b>6.33%</b>	<b>487</b>	<b>1.9%</b>	<b>16.6%</b>
<b>Oilfield Services</b>	<b>\$73.76</b>	<b>13.43%</b>	<b>1199</b>	<b>-1.1%</b>	<b>16.0%</b>
Exploration & Production - Triple B Rated	\$98.45	5.21%	348	-5.9%	-5.3%
Exploration & Production - Double B Rated	\$93.66	6.98%	551	0.6%	17.8%
Exploration & Production - Single B Rated	\$93.09	8.74%	731	1.6%	25.6%
Exploration & Production - Below B Rated	\$53.80	35.63%	3352	10.7%	33.1%
<b>Citi HY Energy Index</b>	<b>\$82.47</b>	<b>9.71%</b>	<b>883</b>	1.5%	<b>16.5%</b>
<b>Citi IG Oil &amp; Gas Index</b>	<b>\$100.88</b>	<b>4.14%</b>	<b>247</b>		7.7%
<b>Citi High Yield Index</b>	<b>\$93.35</b>	<b>7.50%</b>	<b>639</b>	-0.2%	<b>7.4%</b>
BBB - Index	\$104.85	3.63%	199		5.5%
BB - Index	\$99.54	5.50%	410	0.2%	6.7%
B - Index	\$94.15	7.76%	650	0.2%	7.3%
CCC - Index	\$76.19	13.35%	1355	2.4%	16.6%

Source: Citi Research

# Commodity Outlook

- WTI is currently trading at \$49.48 (+34% year-to-date) and Henry Hub is trading at \$2.15 (-16% year-to-date)

Citi Forecast	1Q16	2Q16	3Q16	4Q16	2016	2017	2018
WTI (\$/Bbl)	\$ 34.00	\$ 46.00	\$ 51.00	\$ 50.00	\$ 45.00	\$ 57.00	\$ 61.00
Brent (\$/Bbl)	\$ 35.00	\$ 47.00	\$ 52.00	\$ 52.00	\$ 47.00	\$ 60.00	\$ 64.00
Henry Hub (\$/MMBtu)	\$ 2.00	\$ 2.00	\$ 2.20	\$ 2.50	\$ 2.10	\$ 3.20	\$ 3.00

Source: Citi Research

	2016	2017	2018	2019	2020
WTI	\$ 51.13	\$ 51.68	\$ 53.07	\$ 54.32	\$ 54.32
HH	\$ 2.42	\$ 3.02	\$ 3.19	\$ 3.19	\$ 3.19

Source: Bloomberg

# E&P Capex & Production

## 1Q16 Production Trends:

- The average decline in production on a quarter-over-quarter basis was 3%. WPX experienced the largest production decline on a sequential basis, while SGY experienced the greatest increase. Sequentially, oil production decreased by 2% on average and 4% for the median company. Natural gas production decreased by 5% on average as well as 5% for the median company on a quarterly basis.

## Capex Outlook:

- We believe companies will continue to focus on their best performing assets in 2016 in order to generate returns at lower oil prices, continuing a trend from 2015. However, the longer commodities stay low the more companies will be forced to develop lower quality acreage. The timing of this phenomenon will ultimately depend on each company's inventory of "core" acreage
- Based on the average of 51 high yield E&Ps, capex is expected to be down 52% on average or 57% for the median company.

## Production Outlook:

- Despite a significantly lower capex budget, production is only expected to be down 4% for the average company and 6% for the median company.

Ticker	2015 Actual Capex	2016 Capex Guidance	Capex - % Change from FY15	2015 Actual Production (MBoe/d)	2016 Production Guidance - Mid (MBoe/d)	Production - % Change from FY15	Date of Last Guidance
ALTMES	224	115	-49%	18.8	N/A	N/A	3/29/2016
ANTERO	1,800	1,400	-22%	249	291.7	17%	4/27/2016
AREX	151	20	-87%	15.2	12.3	-19%	5/4/2016
ARP	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BBG	287	113	-61%	18.1	16.4	-9%	5/5/2016
BCEI	404	40	-90%	28.6	20.7	-28%	5/5/2016
BTE CH	521	245	-53%	84.6	70.0	-17%	3/3/2016
CRC	401	50	-88%	104.0	N/A	N/A	
CHK	3,600	1,250	-65%	679.2	620.0	-9%	5/5/2016
CLR	2,500	920	-63%	221.7	210.0	-5%	5/4/2016
CRK	241	59	-76%	30.2	29.0	-4%	5/4/2016
CRZO	509	280	-45%	40.2	38.7	-4%	2/22/2016
CWEI	180	70	-61%	15.8	12.6	-20%	3/9/2016
CXO	1,846	1200	-35%	143	143.3	0%	2/24/2016
DNR	408	200	-51%	72.9	66.0	-9%	2/18/2016
ECR	310	168	-46%	34.7	33.3	-4%	3/2/2016
EGN	1,100	375	-66%	65.8	55.1	-16%	2/11/2016
EVEP	68	14	-79%	29.1	32.8	12%	2/29/2016
FANG	419	313	-25%	33.1	36.0	9%	2/16/2016
GPOR	1,579	450	-72%	91.4	119	30%	2/17/2016
GST	126	37	-71%	13.5	N/A	N/A	3/10/2016
IAE	117	50	-57%	12.1	9.0	-25%	3/23/2016
LGCY	50	37	-26%	45.7	N/A	N/A	
LPI	521	420	-19%	45	44.5	-1%	5/10/2016
LTSCN	107	N/A	N/A	31.4	N/A	N/A	2/11/2016
MEMP	214	70	-67%	42.2	39.3	-7%	1/27/2016
MRD	511	275	-46%	57.5	68.8	18%	5/10/2016
MTDR	482	325	-33%	25.0	26.0	4%	2/3/2016
MUR	2,148	580	-73%	208.0	182.5	-12%	3/22/2016
NFX	1,419	650	-54%	115.6	152.1	32%	5/3/2016
NOG	124	65	-48%	16.3	13.8	-15%	5/9/2016
NBZCN	70	40	-43%	20.9	19.0	-9%	2/12/2016
OAS	610	400	-34%	50.5	47.5	-6%	1/28/2016
PDCE	605	475	-21%	42.1	57.5	37%	12/7/2015
PQ	90	23	-75%	15.6	N/A	N/A	3/28/2016
QEP	1,141	475	-58%	149.2	144.1	-3%	2/24/2016
REN	54	125	132%	12.4	11.1	-11%	2/26/2016
REXX	184	28	-85%	32.6	35.1	8%	3/15/2016
RICE	744	640	-14%	92.0	120.0	30%	2/24/2016
RRC	900	495	-45%	233	235.8	1%	4/28/2016
RSPP	391	230	-41%	21	25.0	19%	2/24/2016
SGY	465	200	-57%	40	27.0	-33%	5/4/2016
SM	1,300	705	-46%	162	145.2	-10%	2/23/2016
SH	545	225	-59%	53	50.0	-5%	2/25/2016
SWN	1,828	375	-79%	446	376.7	-15%	2/25/2016
UHTUS	268	106	-60%	55	47.0	-14%	3/23/2016
VNR	113	76	-33%	69	74.1	7%	5/3/2016
WLL	2,314	500	-78%	163	134.5	-18%	2/24/2016
WPX	865	400	-54%	169	77.5	-54%	2/24/2016
WTI	231	15	-94%	47	42.7	-8%	3/8/2016
XCO	277	85.0	-69%	57	50.1	-12%	5/3/2016

Source: Citi Research, company filings

# Hedged & Unhedged Unlevered Margins

On a hedged basis, the average producer had an unlevered cash margin of \$13.26/Boe during 1Q16 (-41% year-over-year), while on an unhedged basis the cash margin was only \$4.92/Boe (-70% year-over-year)

Company	1Q16 Hedged Margin (\$/Boe)	1Q15 Hedged Margin (\$/Boe)	% Change Y-o-Y	1Q16 Unhedged Margin (\$/Boe)	1Q15 Unhedged Margin (\$/Boe)	% Change Y-o-Y
LPI	\$41.84	\$28.34	48%	\$7.13	\$13.57	-47%
BBG	\$31.96	\$42.38	-25%	\$7.85	\$13.05	-40%
CXO	\$30.63	\$34.62	-12%	\$10.30	\$20.57	-50%
REN	\$28.23	\$28.64	-1%	(\$5.61)	\$8.73	-164%
OAS	\$26.78	\$45.02	-41%	\$10.77	\$20.95	-49%
CRZO	\$24.44	\$31.67	-23%	\$11.06	\$15.91	-30%
MEMP	\$23.60	\$30.82	-23%	\$2.00	\$8.01	-75%
PDCE	\$22.03	\$30.65	-28%	\$7.40	\$13.22	-44%
NBZCN	\$21.98	\$36.43	-40%	\$1.58	\$18.53	-91%
WPX	\$19.90	\$15.45	29%	\$1.65	\$6.57	-75%
ALTMES	\$18.51	\$29.62	-37%	\$3.39	\$9.87	-66%
AR	\$18.45	\$19.20	-4%	\$6.32	\$10.90	-42%
MRD	\$18.44	\$20.24	-9%	\$6.04	\$12.35	-51%
NFX	\$17.34	\$27.25	-36%	\$11.85	\$17.38	-32%
FANG	\$16.92	\$39.81	-57%	\$15.46	\$24.01	-36%
BTECN	\$15.91	\$25.52	-38%	\$9.43	\$13.04	-28%
RSPP	\$15.90	\$41.68	-62%	\$15.03	\$21.14	-29%
SGY	\$15.37	\$21.78	-29%	\$15.26	\$20.66	-26%
CLR	\$14.78	\$23.06	-36%	\$12.92	\$21.80	-41%
DNR	\$14.36	\$33.94	-58%	\$2.92	\$11.75	-75%
SM	\$14.15	\$19.13	-26%	\$3.14	\$9.51	-67%
VNR	\$13.30	\$14.65	-9%	\$2.25	\$7.04	-68%
SN	\$12.69	\$20.47	-38%	\$2.15	\$12.28	-82%
WLL	\$12.46	\$21.46	-42%	\$8.32	\$18.10	-54%
NOG	\$11.77	\$44.59	-74%	\$8.96	\$18.43	-51%
ARP	\$11.33	\$14.32	-21%	(\$2.22)	\$3.85	-158%
RICE	\$10.47	\$12.42	-16%	\$4.21	\$8.27	-49%
LTSCN	\$9.85	\$26.21	-62%	\$7.24	\$16.78	-57%
GST	\$9.35	\$17.04	-45%	(\$0.44)	\$9.21	-105%
ECR	\$8.37	\$8.64	-3%	\$2.35	\$6.15	-62%
OEP	\$8.33	\$18.19	-54%	\$3.66	\$10.06	-64%
CWEI	\$7.73	\$17.65	-56%	\$5.41	\$17.65	-69%
MTDR	\$7.66	\$23.54	-67%	\$4.42	\$14.79	-70%
EGN	\$7.49	\$26.09	-71%	\$6.47	\$11.25	-42%
AREX	\$7.38	\$25.92	-72%	\$4.37	\$13.56	-68%
LGCY	\$6.81	\$19.92	-66%	\$1.31	\$6.65	-80%
UNTUS	\$6.24	\$11.21	-44%	\$4.65	\$9.06	-49%
EVEP	\$6.13	\$17.09	-64%	\$0.12	\$5.29	-98%
RRC	\$5.86	\$11.96	-51%	\$0.65	\$7.06	-91%
CRK	\$5.29	\$16.43	-68%	\$4.93	\$16.43	-70%
GPOR	\$4.85	\$14.97	-68%	\$5.55	\$10.05	-45%
CHK	\$4.80	\$16.17	-70%	\$1.15	\$9.13	-87%
XCO	\$4.61	\$10.80	-57%	\$0.85	\$5.36	-84%
WTI	\$4.52	\$11.00	-59%	\$3.48	\$11.00	-68%
BCEI	\$4.18	\$13.68	-69%	\$0.79	(\$0.64)	-222%
REXX	\$2.39	\$10.01	-76%	(\$1.89)	\$6.24	-130%
CRC	\$2.38	\$13.63	-83%	\$7.07	\$11.96	-41%
SWN	\$1.34	\$1.29	4%	\$0.53	\$4.84	-89%
PQ	\$0.51	\$10.25	-95%	(\$1.31)	\$9.38	-114%
<b>AVERAGE</b>	<b>\$13.26</b>	<b>\$22.34</b>	<b>-41%</b>	<b>\$4.92</b>	<b>\$12.06</b>	<b>-70%</b>

Source: Citi Research, company filings

# Differentials

- We show the wellhead price (unhedged) received for each commodity during the quarter for each company. Across our sample universe of producers the average gas price received was \$1.69/MMBtu (84% of HH) during 1Q16. The Average NGL barrel received 32% of WTI for the quarter at \$10.78/Bbl. Average crude price received was \$27.18/Bbl (80% of WTI).
- Appalachia producers (SWN, AR, RRC, RICE) make up the companies that receive the least favorable oil pricing. Some Bakken producers received unfavorable gas pricing (CLR, WLL). We note that NBZCN's oil price reflects its heavy oil, while its NGL price includes light oil in addition to NGLs.

	Company Unhedged Oil Price (\$/Bbl)	% of NYMEX WTI		Company Unhedged Gas Price (\$/Mcft)	% of NYMEX HH		Company Unhedged NGL Price (\$/Bbl)	% of NYMEX WTI
LTSCN	\$33.59	99%	BTECN	\$2.40	120%	NBZCN	\$35.43	104%
SGY	\$31.22	92%	AR	\$2.08	104%	CRK	\$16.39	48%
PQ	\$31.14	92%	CRK	\$2.05	103%	NFX	\$14.75	43%
DNR	\$30.71	90%	ECR	\$2.05	103%	WTI	\$13.96	41%
ALTMES	\$30.51	90%	MTDR	\$2.04	102%	SGY	\$13.01	38%
RSPP	\$30.35	89%	SN	\$2.03	102%	BCEI	\$12.98	38%
EGN	\$30.17	89%	MEMP	\$2.01	101%	ECR	\$12.70	37%
MRD	\$30.10	89%	WTI	\$2.00	100%	AR	\$12.68	37%
CRK	\$30.08	88%	MRD	\$1.97	99%	LGCY	\$12.60	37%
FANG	\$29.99	88%	QEP	\$1.96	98%	EVEP	\$12.22	36%
CXO	\$29.90	88%	LGCY	\$1.92	96%	REXX	\$12.20	36%
ARP	\$29.51	87%	SM	\$1.87	94%	SM	\$11.76	35%
CHK	\$29.34	86%	LTSCN	\$1.85	93%	CHK	\$11.44	34%
EVEP	\$29.12	86%	NFX	\$1.83	92%	MRD	\$11.30	33%
CRZO	\$28.96	85%	RICE	\$1.83	92%	ALTMES	\$10.99	32%
MTDR	\$28.89	85%	CRK	\$1.82	91%	MEMP	\$10.94	32%
OAS	\$28.74	85%	ARP	\$1.78	89%	PQ	\$10.80	32%
REXX	\$28.71	84%	AREX	\$1.76	88%	QEP	\$9.97	29%
UNTUS	\$28.54	84%	CHK	\$1.75	88%	BBG	\$9.43	28%
LGCY	\$28.36	83%	PQ	\$1.74	87%	GPOR	\$9.24	27%
PDCE	\$28.29	83%	CWEI	\$1.74	87%	SN	\$8.91	26%
XCO	\$28.15	83%	FANG	\$1.74	87%	AREX	\$8.90	26%
CWEI	\$28.10	83%	ALTMES	\$1.73	87%	EGN	\$8.82	26%
MEMP	\$27.89	82%	NBZCN	\$1.72	86%	LPI	\$8.50	25%
QEP	\$27.77	82%	DNR	\$1.70	85%	RRC	\$8.40	25%
BBG	\$27.60	81%	SGY	\$1.70	85%	CRZO	\$8.31	24%
LPI	\$27.51	81%	RRC	\$1.68	84%	VNR	\$8.08	24%
GST	\$27.27	80%	BBG	\$1.66	83%	PDCE	\$7.37	22%
AREX	\$27.10	80%	EVEP	\$1.65	83%	WPX	\$7.14	21%
WLL	\$27.07	80%	REN	\$1.64	82%	UNTUS	\$6.59	19%
BCEI	\$27.02	79%	RSPP	\$1.64	82%	RSPP	\$5.88	17%
WTI	\$26.73	79%	EGN	\$1.61	81%	WLL	\$5.48	16%
NFX	\$26.70	79%	UNTUS	\$1.59	80%	SWN	\$4.98	15%
VNR	\$26.57	78%	CRZO	\$1.54	77%	REN	\$4.30	13%
CRK	\$26.44	78%	XCO	\$1.54	77%			
GPOR	\$26.32	77%	WPX	\$1.52	76%			
SN	\$26.04	77%	CXO	\$1.50	75%			
CLR	\$25.72	76%	NOG	\$1.47	74%			
SM	\$25.67	76%	OAS	\$1.44	72%			
WPX	\$25.62	75%	SWN	\$1.44	72%			
BTECN	\$25.17	74%	BCEI	\$1.39	70%			
NOG	\$24.61	72%	GPOR	\$1.39	70%			
ECR	\$23.21	68%	PDCE	\$1.39	70%			
REN	\$23.16	68%	REXX	\$1.37	69%			
NBZCN	\$22.20	65%	CLR	\$1.36	68%			
AR	\$21.56	63%	LPI	\$1.31	66%			
RRC	\$20.00	59%	VNR	\$1.30	65%			
SWN	\$18.65	55%	GST	\$1.25	63%			
RICE	\$15.83	47%	WLL	\$1.05	53%			
<b>AVERAGE</b>	<b>\$27.18</b>	<b>80%</b>		<b>\$1.69</b>	<b>84%</b>		<b>\$10.78</b>	<b>32%</b>

Source: Citi Research, company filings

# Oil Hedges

- **Remaining 2016:** Based on a sample universe of 49 high yield issuers, for the remainder of 2016, we estimate about ~47% of oil production is protected from downside moves and the average price protected is \$62.30. We estimate ~59% is hedged considering all strategies for our sample universe of 49 companies.
- **2017:** It appears companies are slowly adding oil hedges in 2017 - we now estimate about ~19% of estimated production is protected from downside moves versus 9% as of 3Q15. 26% is hedged considering all strategies now. The average price protected is \$57.70.
- **Companies with long-dated oil hedges:** Alta Mesa, Atlas Resource Partners, and Memorial Production Partners have hedges through 2019, while Gastar, PDC Energy, Northern Blizzard and Resolute have hedges through 2018. Chesapeake has oil hedges through 2022 and Carrizo has hedges through 2020.

Oil- Volumes Hedged by Strategy (MBbls)						
Hedge Type	2Q16	3Q16	4Q16	Rem. 2016	2017	2018
Swap	47,272	48,741	47,900	143,913	81,937	16,029
Basis	12,036	11,638	11,178	34,851	25,853	0
2-way Collar	6,664	6,350	5,522	18,536	11,740	504
3-way Collar	8,172	7,482	7,516	23,170	9,311	0
Put Spread	1,140	1,356	1,473	3,969	183	103
Short Call	3,663	3,747	3,746	11,156	9,443	1,585
Long Call	712	4,032	3,664	8,408	7,278	730
Short Put	79	79	79	238	1,486	1,183
Long Put	2,608	2,684	2,684	7,976	2,882	2,232
Enhanced Swap	3,205	2,504	2,136	7,845	4,468	0
<b>Total Hedged</b>	<b>85,553</b>	<b>88,613</b>	<b>85,898</b>	<b>260,064</b>	<b>154,580</b>	<b>22,366</b>
Est. Combined Production	147,859	146,718	145,413	439,990	594,194	594,194
<i>Est Percentage Hedged (All Strategies)</i>	58%	60%	59%	59%	26%	4%
<b><i>Est Percentage Hedged (Ex-Items)*</i></b>	<b>47%</b>	<b>47%</b>	<b>46%</b>	<b>47%</b>	<b>19%</b>	<b>3%</b>

Weighted Average Hedge Prices	2Q16	3Q16	4Q16	Rem. 2016	2017	2018
Average Swap Price	\$63.47	\$60.95	\$59.00	\$61.14	\$57.78	\$61.36
Average 2-Way Floor	\$58.38	\$58.85	\$59.63	\$58.96	\$50.94	\$40.00
Average 3-Way Floor	\$64.08	\$61.72	\$61.77	\$62.53	\$58.19	\$0.00
Average Long Put Price	\$63.86	\$63.20	\$63.20	\$63.42	\$33.84	\$28.20
Average Enhanced Swap Price	\$90.30	\$89.66	\$89.47	\$89.81	\$88.31	\$0.00
<b>Average Price Protected on Downside</b>	<b>\$64.33</b>	<b>\$61.99</b>	<b>\$60.53</b>	<b>\$62.30</b>	<b>\$57.70</b>	<b>\$56.84</b>
Average 3-Way Collar Sub-Floor	\$52.08	\$50.06	\$50.01	\$50.71	\$46.01	\$0.00
Average Enhanced Swap Short Put	\$73.66	\$74.09	\$73.93	\$73.89	\$73.25	\$0.00

Source: Citi Research, company filings

# Natural Gas Hedges

- **Remaining 2016:** Based on a sample universe of 49 high yield issuers, for the last three quarters of 2016, we estimate about 61% of estimated production is hedged considering all strategies. 49% of 2016 production is hedged against downside moves for our sample universe
- **2017:** We now estimate about ~15% of estimated production is protected from downside moves. 22% is hedged considering all strategies
- **Hedge Prices:** Companies are hedged at an average price of \$3.41/Mmbtu for 2Q16. The average price is \$3.43/Mmbtu for the last three quarters of 2016. Basis hedges account for 16% of total hedged volume for 2Q16 and 17% for 2016. Average basis for 2016 is \$0.25/Mmbtu.

Nat Gas - Volumes Hedged by Strategy (MMcf)						
Hedge Type	2Q16	3Q16	4Q16	Rem. 2016	2017	2018
Swap	589,208	590,392	581,956	1,761,557	611,840	392,541
Basis	138,073	139,175	142,211	419,459	237,855	164,220
2-way Collar	25,174	25,296	25,296	75,765	170,170	103,430
3-way Collar	17,868	17,931	17,779	53,578	42,665	7,300
Put Spread	525	525	525	1,575	0	0
Call Spread	0	0	0	0	0	0
Short Call	30,020	30,020	30,020	90,059	97,098	72,163
Short Put	458	458	458	1,373	8,395	5,475
Long Put	46,963	33,963	24,963	105,889	27,826	15,825
Long Call	0	0	0	0	0	0
Enhanced Swap	1,082	1,084	1,084	3,250	2,100	1,800
<b>Total Hedged</b>	<b>849,370</b>	<b>838,843</b>	<b>824,290</b>	<b>2,512,503</b>	<b>1,197,949</b>	<b>762,754</b>
Est. Combined Production	1,385,977	1,370,228	1,364,308	4,120,513	5,537,666	5,537,666
<i>Estimated % Hedged (All Strategies)</i>	<i>61%</i>	<i>61%</i>	<i>60%</i>	<i>61%</i>	<i>22%</i>	<i>14%</i>
<b><i>Estimated % Hedged (Ex-Items)*</i></b>	<b><i>49%</i></b>	<b><i>49%</i></b>	<b><i>48%</i></b>	<b><i>49%</i></b>	<b><i>15%</i></b>	<b><i>9%</i></b>

Hedge Prices	2Q16	3Q16	4Q16	Rem. 2016	2017	2018
Average Swap Price	\$3.56	\$3.56	\$3.57	\$3.56	\$3.74	\$3.99
Average 2-Way Floor	\$3.16	\$3.16	\$3.16	\$3.16	\$2.95	\$3.16
Average 3-Way Floor	\$2.84	\$2.83	\$2.83	\$2.84	\$3.47	\$3.00
Average Long Put Price	\$1.88	\$1.70	\$1.47	\$1.68	\$1.85	\$0.00
Average Enhanced Swap Price	\$4.11	\$4.11	\$4.11	\$4.11	\$4.07	\$4.05
<b>Average Price Protected on Downside</b>	<b>\$3.41</b>	<b>\$3.43</b>	<b>\$3.46</b>	<b>\$3.43</b>	<b>\$3.51</b>	<b>\$3.69</b>
Average Basis Price	(\$0.25)	(\$0.25)	(\$0.24)	(\$0.25)	(\$0.35)	(\$0.35)

Source: Citi Research, company filings

# Master Liquidity Summary

Company	Moody's	S&P	Cash	Revolver Size	Revolver Availability	Letters of Credit	Total Liquidity	Revolver Utilization	4Q15 Liquidity	Change from 4Q15 Liquidity	Revolver Maturity	Last Redetermination	FY15 Rev Size	Change in Rev Size	Change in BB Size
ARP	N/A	CCC-	19	700	28	(4)	43	98%	105	-59%	7/1/2018	11/1/2015	700	0%	0%
ALTMES	Caa3	CCC+	146	300	6	(6)	146	98%	155	-6%	10/1/2017	2/3/2016	300	0%	0%
AR	Ba2	BB	40	4,000	3,320	(702)	2,658	17%	2,614	2%	5/1/2019	4/14/2016	4,000	0%	0%
AREX	Caa2	CCC+	1	325	53	(0)	54	84%	177	-70%	5/1/2019	5/1/2016	450	-28%	-28%
BBG	Caa2	B-	106	335	335	(26)	415	0%	478	-13%	4/1/2020	4/11/2016	375	-11%	-11%
BCEI	Caa3	CCC	219	200	(88)	(12)	118	144%	405	-71%	9/1/2017	5/20/2016	475	-58%	-58%
BTE CN	Caa1	BB	0	650	364	(0)	364	44%	815	-55%	6/1/2018	N/A-not RBL	1,067	-39%	-39%
CHK	Caa2	CCC	16	4,000	3,633	(619)	3,030	9%	4,809	-37%	12/1/2019	4/11/2016	4,000	0%	0%
CLR	Ba3	BB+	13	2,750	1,920	(5)	1,928	30%	1,903	1%	5/1/2019	N/A-Unsec.	2,750	0%	0%
CRC	Caa1	CCC+	10	1,600	905	0	915	43%	1,273	-28%	9/1/2019	5/1/2016	2,000	-20%	-23%
CRK	Caa2	SD	86	50	50	0	136	0%	184	-26%	3/1/2019	N/A-not RBL	50	0%	0%
CRZO	B2	B+	2	600	569	(1)	571	5%	727	-21%	7/1/2018	5/3/2016	685	-12%	-12%
CWEI	Caa3	CCC+	185	100	100	(2)	283	0%	351	-19%	4/1/2019	3/8/2016	450	-78%	-78%
CXO	Ba1	BB+	467	2,500	2,500	0	2,967	0%	2,729	9%	5/1/2019	4/1/2016	2,500	0%	-14%
DNR	Caa2	CCC+	8	1,050	740	(59)	689	30%	1,428	-52%	12/1/2019	4/19/2016	1,600	-34%	-60%
ECR	Caa2	CC	115	125	125	(28)	212	0%	282	-25%	1/1/2018	2/1/2016	125	0%	0%
EGN	B1	BB	36	1,050	1,050	0	1,086	0%	1,179	-8%	8/1/2019	4/14/2016	1,400	-25%	-25%
EVEP	Caa2	CCC+	4	450	165	(0)	168	63%	380	-56%	2/1/2020	4/1/2016	625	-28%	-28%
FANG	B1	B+	236	500	632	0	868	-26%	509	70%	11/1/2018	5/1/2016	500	0%	-7%
GPOR	B1	B+	454	700	700	(228)	927	0%	634	46%	6/1/2018	2/17/2016	700	0%	0%
GST	Caa2	CCC-	27	100	0	(0)	27	100%	50	-46%	11/1/2017	4/8/2016	200	-50%	-50%
LGCY	Caa3	B-	5	630	70	(1)	74	89%	294	-75%	4/1/2019	5/4/2016	900	-30%	-30%
LPI	B2	B	16	815	709	(0)	725	13%	896	-19%	11/1/2018	5/2/2016	1,000	-19%	-29%
LTS CN	Ca	CCC-	0	250	(121)	(11)	(132)	148%	198	-167%	6/1/2017	4/23/2016	550	-55%	-55%
MEMP	Caa2	B-	1	925	133	(2)	132	86%	337	-61%	10/1/2016	4/14/2016	1,175	-21%	-21%
MRD	B2 *	B *	2	1,000	476	(0)	478	52%	579	-17%	6/1/2019	4/11/2016	1,000	0%	0%
MTDR	B2	B	118	300	300	(1)	418	0%	391	7%	12/1/2016	5/3/2016	375	-20%	-20%
NBZ CN	B2	B	0	475	469	(4)	465	1%	536	-13%	7/1/2016	10/30/2015	530	-10%	-10%
NFX	Ba3	BB+	537	1,800	1,800	0	2,337	0%	1,805	29%	6/1/2020	N/A-Unsec.	1,800	0%	0%
NOG	Caa2	CCC+	4	350	233	(0)	237	33%	403	-41%	9/1/2018	5/1/2016	550	-36%	-36%
OAS	B3	B+	19	1,150	1,050	(14)	1,056	9%	1,391	-24%	4/1/2020	2/23/2016	1,525	-25%	-25%
PDCE	B1	B+	124	450	450	(12)	562	0%	402	40%	5/21/2020	5/16/2016	450	0%	0%
PQ	Caa3	SD	71	11	11	0	82	5%	203	-60%	10/1/2016	1/1/2016	55	-80%	-24%
QEP	B1	BB+	616	1,800	1,800	(3)	2,414	0%	2,172	11%	12/1/2019	N/A, Unsec.	1,800	0%	0%
REN	Caa3	CCC-	3	105	105	(4)	104	0%	151	-31%	3/1/2018	3/25/2016	145	-28%	-28%
REXX	Ca	SD	15	190	42	(41)	16	78%	199	-92%	9/1/2019	4/1/2016	350	-46%	-46%
RICE	B2	B	667	1,625	1,456	(212)	1,911	10%	1,393	37%	1/1/2019	5/16/2016	1,500	8%	8%
RRC	Ba3	BB+	1	1,500	1,477	(231)	1,247	2%	1,776	-30%	10/1/2019	3/17/2016	2,000	-25%	0%
RSPP	B2	B+	74	600	600	(1)	673	0%	742	-9%	8/1/2019	5/1/2016	600	0%	0%
SGY	Ca	D	367	300	(157)	(19)	191	152%	492	-61%	7/1/2019	4/13/2016	500	-40%	-40%
SM	B2	BB-	0	1,250	957	(0)	957	23%	1,298	-26%	12/1/2019	4/13/2016	1,500	-17%	-38%
SN	Caa1	B	362	300	300	0	662	0%	735	-10%	6/1/2019	3/21/2016	300	0%	-30%
SWIN	B1	BB+	1,597	2,000	148	(148)	1,597	93%	2,047	-22%	12/14/2018	N/A -Unsec.	2,000	0%	0%
UNT	B2	B+	1	475	215	0	216	55%	220	-2%	4/1/2020	4/8/2016	500	-5%	-14%
VNR	Caa3	CC	0	1,780	383	(5)	378	79%	108	252%	4/1/2018	11/6/2015	1,800	-1%	-1%
WLL	Caa1	B+	1	2,500	1,500	(2)	1,499	40%	2,737	-45%	12/1/2019	3/25/2016	3,500	-29%	-31%
WPX	B2	B+	583	1,025	850	0	1,433	17%	1,523	-6%	10/1/2019	3/22/2016	1,750	-41%	-41%
WTI	Caa3	CCC-	359	150	(126)	(1)	232	184%	435	-47%	11/1/2018	3/24/2016	350	-57%	-57%
XCO	Caa2	SD	46	325	192	(10)	229	41%	313	-27%	7/1/2018	3/30/2016	375	-13%	-13%

Source: Citi Research, company filings

# Spring Redetermination Results

- **Spring Redetermination Nearly Complete:** The Spring redetermination process is nearing an end as 40 high yield companies in our universe of 49 have announced borrowing base results (three have yet to announce and six do not have borrowing bases). The average borrowing base change has been down 24%, with nine borrowing bases affirmed (23%) and 29 decreasing on average 33%. RICE is the only E&P to experience an increase to its borrowing base so far. RBL sizes were down 22% as nine of the companies which experienced borrowing base declines entered the redetermination with borrowing bases above their lender commitments
- **Borrowing base Deficiencies:** BCEI, SGY, VNR and LTSCN had borrowing base redeterminations that resulted in deficiencies. Furthermore, ARP has not announced borrowing base results, but expects a borrowing base deficiency.
- **Borrowing Base Cushions:** Before the latest cycle of borrowing base redeterminations began, 12 companies in our universe (24%) had lender commitments that were lower than their borrowing bases, insulating liquidity from cuts in the borrowing base. All of those companies have now undergone the spring borrowing base redetermination, and now have an average cushion of 17% compared to 26% at 4Q15.

Company	Moody's	S&P	Cash	Revolver Size	Revolver Availability	Letters of Credit	Total Liquidity	Revolver Utilization	Last Redeterminat	FY15 Rev Size	Change in Rev Size	Change in BB Size
VNR	Caa3	CC	0	1,325	(99)	(5)	(104)	107%	5/2/2016	1,800	-26%	-26%
BCEI	Caa3	CCC	219	200	(68)	(12)	118	144%	5/20/2016	475	-58%	-58%
RICE	B2	B	667	1,625	1,456	(212)	1,911	10%	5/16/2016	1,500	8%	8%
PDCI	B1	B+	124	450	450	(12)	562	0%	5/16/2016	450	0%	0%
LGCY	Caa3	B-	5	630	70	(1)	74	89%	5/4/2016	900	-30%	-30%
CRZO	B2	B+	2	600	569	(1)	571	5%	5/3/2016	685	-12%	-12%
MTDR	B2	B	118	300	300	(1)	418	0%	5/3/2016	375	-20%	-20%
LPI	B2	B	16	815	709	(0)	725	13%	5/2/2016	1,000	-19%	-29%
NOG	Caa2	CCC+	4	350	233	(0)	237	33%	5/1/2016	550	-36%	-36%
CRC	Caa1	CCC+	10	1,600	905	0	915	43%	5/1/2016	2,000	-20%	-23%
AREX	Caa2	CCC+	1	325	53	(0)	54	84%	5/1/2016	450	-28%	-28%
FANG	B1	B+	236	500	632	0	868	-26%	5/1/2016	500	0%	-7%
RSPP	B2	B+	74	600	600	(1)	673	0%	5/1/2016	600	0%	0%
LTS CN	Ca	CCC-	0	250	(121)	(11)	(132)	148%	4/29/2016	550	-55%	-55%
DNR	Caa2	CCC+	8	1,050	740	(59)	689	30%	4/19/2016	1,600	-34%	-60%
MEMP	Caa2	B-	1	925	133	(2)	132	86%	4/14/2016	1,175	-21%	-21%
AR	Ba2	BB	40	4,000	3,320	(702)	2,658	17%	4/14/2016	4,000	0%	0%
EGN	B1	BB	36	1,050	1,050	0	1,086	0%	4/14/2016	1,400	-25%	-25%
SGY	Ca	D	367	300	(157)	(19)	191	152%	4/13/2016	500	-40%	-40%
SM	B2	BB-	0	1,250	957	(0)	957	23%	4/13/2016	1,500	-17%	-38%
CHK	Caa2	CCC	16	4,000	3,633	(619)	3,030	9%	4/11/2016	4,000	0%	0%
BBG	Caa2	B-	106	335	335	(26)	415	0%	4/11/2016	375	-11%	-11%
MRD	B2 *+	B *+	2	1,000	476	(0)	478	52%	4/11/2016	1,000	0%	0%
GST	Caa2	CCC-	27	100	0	(0)	27	100%	4/8/2016	200	-50%	-50%
UNT	B2	B+	1	475	215	0	216	55%	4/8/2016	500	-5%	-14%
EVEP	Caa2	CCC+	4	450	165	(0)	168	63%	4/1/2016	625	-28%	-28%
REXX	Ca	SD	15	190	42	(41)	16	78%	4/1/2016	350	-46%	-46%
CXO	Ba1	BB+	467	2,500	2,500	0	2,967	0%	4/1/2016	2,500	0%	-14%
XCO	Caa2	SD	46	325	192	(10)	229	41%	3/30/2016	375	-13%	-13%
WLL	Caa1	B+	1	2,500	1,500	(2)	1,499	40%	3/25/2016	3,500	-29%	-31%
REN	Caa3	CCC-	3	105	105	(4)	104	0%	3/25/2016	145	-28%	-28%
WTI	Caa3	CCC-	359	150	(126)	(1)	232	184%	3/24/2016	350	-57%	-57%
WPIX	B2	B+	583	1,025	850	0	1,433	17%	3/22/2016	1,750	-41%	-41%
SN	Caa1	B	362	300	300	0	662	0%	3/21/2016	300	0%	-30%
RRC	Ba3	BB+	1	1,500	1,477	(231)	1,247	2%	3/17/2016	2,000	-25%	0%
CWEI	Caa3	CCC+	185	100	100	(2)	283	0%	3/8/2016	450	-78%	-78%
OAS	B3	B+	19	1,150	1,050	(14)	1,056	9%	2/23/2016	1,525	-25%	-25%
GPOR	B1	B+	454	700	700	(228)	927	0%	2/17/2016	700	0%	0%
ALTMES	Caa3	CCC+	146	300	6	(6)	146	98%	2/3/2016	300	0%	0%
ECR	Caa2	CC	115	125	125	(28)	212	0%	2/1/2016	125	0%	0%
<b>AVERAGE</b>											<b>-22%</b>	<b>-24%</b>

Source: Citi Research, company filings

# E&P Capital Markets Activity

- **Equity Issuance:** High Yield E&Ps continued to issue equity during the second quarter after issuing ~\$3.9BN in equity in 1Q16. Quarter to date HY E&Ps have issued ~\$1.4BN in equity. Use of proceeds included funding acquisitions, refinancings and funding capex.
- **Debt Issuance:** There has been only one broadly syndicated debt issuance amongst high yield E&P companies this quarter after seeing no issuance in 1Q16. We think the debt market will open slowly for higher quality companies this year although investors will be selective on a credit-by-credit basis in deciding which deals to participate in.
- **Repurchases:** Companies have taken advantage of low trading levels to repurchase their debt in the open market opportunistically. Since the end of 1Q16 the following companies have repurchased debt using cash: ECR, EVEP, OAS, WPX. The amount a company can repurchase in the open market is limited often times by their credit agreements and bond indentures. In addition companies have to be aware of the ‘creeping tender’.
- **Exchanges:** During 1Q16 exchange activity slowed compared to an active 4Q15 as investors seemed less willing to exchange par bonds for a discounted claim on more senior paper. The DNR subordinated into unsecured exchange announced in December was pulled in January and the ALTMES and ECR exchanges (unsecured bonds into 2<sup>nd</sup> liens) were also cancelled. In April and May exchange activity picked up although the structure shifted to a debt for equity type exchange (rather than exchanges involving unsecured debt for secured debt) as investors opened up to upside potential from holding equity. However, many transactions still contain a cash component in addition to equity.

Company	Exchange Description	Announced Date
DNR	DNR offered its Sr Subordinated note holders the option to exchange a portion of its notes for new 7.5% senior notes due 2022 at a 65% exchange rate before the early participation deadline and 60% after the deadline. The exchange was pulled due to lack of interest.	December 2015
VNR	Exchanged \$168.2MM of Existing notes (30.6% of the total outstanding amount that was offered in the exchange) at a 45% exchange rate	1/8/2016
ECR	Offered to exchange its 8.875% Sr Notes due 2018 for new 9.00% 2nd lien notes due 2023 at 50% (55% including early participation premium). The exchange was pulled due to lack of interest	1/21/2016
ALTMES	Offered to exchange its 9.625% Sr Notes due 2018 for new 10.625% 3rd lien term loans due 2021 at 55% (60% including early participation premium). The exchange was pulled due to lack of interest	2/11/2016
WLL	Entered into exchange agreements for \$48.7MM Sr Sub Notes into subordinated convertible notes at 100% and \$381MM face value of unsecured notes into unsecured convertible notes at 100% of face value (\$429.7MM in total)	3/18/2016
PQ	Exchanged \$214.4MM (61%) its 10% Sr. Nts. Due 2017 for (i) \$53.6MM cash, (ii) \$144.7MM of 10% 2nd Lien Nts. Due 2021 and (iii) 4.3MM shares	1/14/2016
REXX	Announced offer to exchange 8.875% Sr. Nts. Due 2020 and 6.25% Sr. Nts. Due 2022 for (i) \$675MM 10% 2nd Lien Nts. Due 2020 and (ii) 10.125MM shares	2/3/2016
IO	Announced an offer to exchange its 8.125% Sr. Sec. 2nd lien Nts. Due 2018 for (i) new 9.125% Sr. Sec. 2nd lien Nts. Due 2021 on a par for basis and (ii) either 10 shares (if tendered before the early tender date) or 7 shares (if tendered after the early tender date)	3/28/2016
REXX	During April REXX completed two privately negotiated exchanges of \$17.2MM of Sr. Nts. due 2020, \$9.7MM of Sr. Nts. Due 2022, \$2.2MM of 2nd lien notes due 2020 and \$13.8MM face value of Series A Preferred Stock for ~7.1MM shares	April 2016
CRC	Exchanged \$80MM (in total) of its 6% Sr. Nts. due 2024 and 5.5% Sr. Nts. due 2021 for ~20.9MM shares	5/9/2016
CHK	In May the company announced two exchange transactions where it exchanged debt for stock. Combined CHK exchanged ~85.2MM shares for ~\$319MM face value of four tranches of debt	5/12/2016; 5/24/2016
CRK	Year to date CRK repurchased and exchanged \$234MM of its senior notes for \$46MM in cash and 12.2MM shares	Repurchased throughout 2016
DNR	Announced offer to exchange \$135.3MM of its senior subordinated notes due 2021, 2022, and 2023 for (i) \$83.8MM 9% 2nd Lien Nts. Due 2021 and (ii) ~3.8MM shares	5/16/2016
LGCY	Announced offer to exchange \$15MM of its 8% Sr. Nts. Due 2020 for ~2.72MM shares	5/24/2016

Source: Citi Research, company filings

# Defaults

- **Year-to-Date Filings:** We have seen thirteen high yield E&Ps file for chapter 11 so far this year. Combined, they represent \$30BN in debt, over half of which is secured. Six of the thirteen filed in May. CJES, in the offshore services space is exploring balance sheet alternatives, but has not announced a filing.
- **2015 Defaults:** We also saw nine HY E&Ps file for bankruptcy last year: Milagro, Sabine, Samson, Quicksilver, Connacher, American Eagle Energy, RAAM Global, Energy & Exploration Partners, Magnum Hunter. Hercules and Vantage, in the offshore driller space, also filed. Together, they represented ~\$14.5bn par value or ~8% of the January HY Energy Index
- **Outlook:** Using our credit strategy team's approach as of March, we calculated average default probability of 14% for 2016 based on characteristics of 47 high yield E&Ps

2016 HY Energy Bankruptcies

Company	Sector	Date of Filing	Secured Debt (\$MM)	Unsecured Debt (\$MM)	Total debt at filing (\$MM)
Halcon Resources	E&P	5/18/2016	1,947	933	2,880
Sandridge Energy	E&P	5/16/2016	1,757	2,225	3,981
Breitburn Energy	E&P	5/16/2016	1,851	1,851	3,702
Penn Virginia	E&P	5/12/2016	147	1,075	1,222
Linn Energy	E&P	5/11/2016	5,467	4,421	9,888
Chaparral	E&P	5/9/2016	548	1,238	1,786
Midstates Petroleum	E&P	4/30/2016	1,404	641	2,045
Ultra Petroleum	E&P	4/29/2016	999	2,760	3,759
Goodrich Petroleum	E&P	4/15/2016	215	229	444
Venoco Inc	E&P	3/18/2016	399	308	708
Energy XXI	E&P	3/17/2016	1,553	2,070	3,623
Warren Resources	E&P	3/2/2016	287	169	456
Swift Energy	E&P	1/4/2016	302	875	1,177
<b>SUM</b>			<b>16,875</b>	<b>15,144</b>	<b>29,263</b>

Source: Citi Research, company filings

# Historical Recovery Rates

- Historical recoveries in the Energy sector have been ~98% for secured bank debt and ~34% for unsecured bonds
- With incremental secured debt (1.5 liens, 2<sup>nd</sup> liens, and 3<sup>rd</sup> liens) recoveries for unsecured notes may be lower in this cycle
- We also note that the bankruptcies last year have tended not to be smooth, which may limit opportunistic filings by companies. Companies are taking longer to exit bankruptcy and assets are fetching less in auctions. As a result, investors seem less inclined to participate in distressed exchanges. They are not buying into the "game theory" of being ahead in the capital structure and would prefer to have a par unsecured claim versus a discounted 2nd lien claim (in order to capture more value from unencumbered assets).

Historical Recovery Rates (Moody's)

Seniority	E&P Issuers (1988-2013)		Moody's Recovery Database (1987-2014)	
	Avg Recovery Rate	Sample Size	Avg Recovery Rate	Sample Size
Secured bank debt	97.5%	34	81.3%	1569
Borrowing Base Facility	97.6%	16	97.0%	229
Other secured	97.4%	18	78.6%	1340
Sr Unsecured Bonds	33.7%	24	41.4%	1100
Subordinated Bonds	26.9%	30	20.2%	821
Firm-wide Recovery Rate	58.6%	33	51.2%	892

Source: Moody's Investors Services

# Fallen Angels

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- So far \$21bn of debt has fallen fall to HY this year including CLR, ECACN, MUR, SWN). However, ECACN went back to the IG index given BBB Fitch ratings. Moody's has been more aggressive than S&P in downgrading to HY ratings, downgrading a total of ~\$80bn in 1Q16.
- We think companies with flexibility will try to improve their balance sheets by reducing their dividend, issuing equity or cutting capital spending rather than take the ratings cut.
- There is ~\$130BN of BBB E&P debt in Citi's IG index and ~\$160BN of BBB midstream debt.

# Appendix A-1

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<i>Data current as of 31 Mar 2016</i>	<i>Rating</i>		
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Citi Research US High Yield Issuer Coverage	23%	67%	10%
<i>% of companies in each rating category that are investment banking clients</i>	78%	70%	55%

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