

# A Case Study of Midland Energy Resources Inc.

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## Introduction

Midland was a global energy company with operations in oil and gas exploration and production (EP), refining and marketing (R& M), and petrochemicals. We estimate various financial variables of Midland Energy for the year 2007 in this study.

## Cost of Capital and Corporate WACC

Midland's analysts used the CAPM model to estimate cost of capital,  $r_E$ . The CAPM model relates expected return on equity to the risk free rate and EMRP as :

$$r_E = r_f + \beta(r_M - r_f)$$

Midland's analysts used beta published in commercially available databases. They chose an EMRP of 5 %. Historical data suggested a much higher EMRP upwards of 6 %, while recent surveys suggested lower EMRPs. We believe that instead of relying on historical data Midland should've considered a lower EMRP as suggested in the surveys, which were quite recent and from reputed sources. (The observation period for historical data started from 1987, and we expect a change in market efficiency from the popularisation of computers and internet in the 90s)

For consistency, we use Midland's EMRP of 5% in our calculations.

$$r_f = 4.66\%$$

$$r_E = 4.66 + 1.25 \times 5\% = 10.91\%$$

To calculate  $r_D$  we use the risk free rate and consolidated spread to treasury to get

$$r_D = 4.66\% + 1.62\% = 6.28\%$$

From the balance sheet attached below, we get

### **MIDLAND ENERGY RESOURCES**

<u>Assets:</u>	2005	2006
Cash & Cash equivalents	16,707	19,206
Restricted Cash	3,131	3,131
Notes Receivable	18,689	19,681
Inventory	6,338	7,286
Prepaid Expenses	<u>2,218</u>	<u>2,226</u>
<b>Total Current Assets</b>	<b>47,083</b>	<b>51,528</b>
Investments & Advances	30,140	34,205
Net Property, Plant & Equipment	1,56,630	1,67,350
Other Assets	<u>10,818</u>	<u>9,294</u>
<b>Total Assets</b>	<b>2,44,671</b>	<b>2,62,378</b>
<u>Liabilities &amp; Owners' Equity:</u>		
Accounts Payable & Accrued Liabilities	24,562	26,576
Current Portion of Long Term Debt	26,534	20,767
Taxes Payable	<u>5,723</u>	<u>5,462</u>
<b>Total Current Liabilities</b>	<b>56,819</b>	<b>52,805</b>
Long Term Debt	82,414	81,078
Post Retirement Benefit Obligations	6,950	9,473
Accrued Liabilities	4,375	4,839
Deferred Taxes	14,197	14,179
Other Long Term Liabilities	2,423	2,725
Total Shareholders' Equity	<u>77,493</u>	<u>97,280</u>
<b>Total Liabilities &amp; Owners' Equity</b>	<b>2,44,671</b>	<b>2,62,378</b>

Figure 1: Balance Sheet

$$\frac{D}{V} = 37.2\% \quad \frac{E}{V} = 62.78\%$$

$$r_{WACC} = r_E \frac{E}{V} + r_D(1 - \tau_C^1) \frac{D}{V} = 8.25\%$$

## Valuing Investments

Midland used DCF methodologies to evaluate most prospective investments. Midland's DCF methods typically involved debt-free cash flows and a hurdle rate equal to or derived from the WACC for the project or division. We believe that discounting with a single corporate hurdle rate is wrong since the risk of a project may be quite different from the risk of the firm as a whole ; and the approach used by them to discount each project based on it's risk is correct.

As mentioned in the case study, the leverage capabilities for different projects are different as they are susceptible to political risks as well. The debt betas for different divisions therefore should be different. Also the oil prices are highly variable, which results in a variable stock price. The values of commodities in different divisions are not as volatile, hence by natural flow of logic, it would be better to consider the different equity betas as well. This calls for an investment valuation, that considers project specific risks and should not use the corporate wacc to be a common discounting factor across all projects.

<sup>1</sup>Average tax rate over the previous 3 years was taken (39.7 %)

## Division wise costs of capital

The general idea to calculate division wise costs of capitals is to use the method of comparables. We need to identify firms with expected future cash flows, capital structure, and investment policies similar to a division to use their cost of capital to make estimates about our division. Using a collection of firms instead of a single one is desirable to eliminate idiosyncratic risk. We are provided with a list of comparable firms for E&P and Marketing & Refinement divisions shown below :

	Equity Market Value	Net Debt	D/E	Equity Beta	LTM Revenue	LTM Earnings
<u>Exploration &amp; Production:</u>						
Jackson Energy, Inc.	57,931	6,480	11.2%	0.89	18,512	4,981
Wide Palin Petroleum	46,089	39,375	85.4%	1.21	17,827	8,495
Corsicana Energy Corp.	42,263	6,442	15.2%	1.11	14,505	4,467
Worthington Petroleum	27,591	13,098	47.5%	1.39	12,820	3,506
<b>Average</b>			<b>39.8%</b>	<b>1.15</b>		
<u>Refining &amp; Marketing:</u>						
Bexar Energy, Inc.	60,356	6,200	10.3%	1.70	1,60,708	9,560
Kirk Corp.	15,567	3,017	19.4%	0.94	67,751	1,713
White Point Energy	9,204	1,925	20.9%	1.78	31,682	1,402
Petrarch Fuel Services	2,460	-296	-12.0%	0.24	18,874	112
Arkana Petroleum Corp.	18,363	5,931	32.3%	1.25	49,117	3,353
Beaumont Energy, Inc.	32,662	6,743	20.6%	1.04	59,989	1,467
Dameron Fuel Services	48,796	24,525	50.3%	1.42	58,750	4,646
<b>Average</b>			<b>20.3%</b>	<b>1.20</b>		
<b>Midland Energy Resources</b>	<b>1,34,114</b>	<b>79,508</b>	<b>59.3%</b>	<b>1.25</b>	<b>2,51,003</b>	<b>18,888</b>

Figure 2: Comparable firms

We have the  $r_D$  for each division, and need to find  $r_E$  to find  $r_{WACC}$ . For this, we calculate the average asset (unlevered) beta for comparable firms, and then lever it based on the debt-to-equity ratio of the division. From the levered equity beta we get  $r_E$  using CAPM.

As expected, the cost of capitals for the EP and RM divisions turn out to be different.

$$EP \ r_{WACC} = 8.0544$$

$$RM \ r_{WACC} = 9.0735$$

The reasons are as follows:

- The credit rating for the EP and the RM divisions are different, causing a change in the spread to treasury for the two.
- The debt/value ratio for the two divisions is different, and as the equity percentage reduces, the equity beta drastically increases for a constant asset beta
- The asset betas for the two firms ( Calculated using comparable firms ) is different, the risk for RM is greater than that of the EP division which can be accounted to the variable pricing and the competitive market that the RM division encounters

The EP division has a better credit rating and a lower asset beta which eventually make it have a lower wacc as compared to the RM division.

## Cost of Capital for Petrochemicals

We know the equity beta ( $r_E$ ) for the firm to be 1.25. Using this we calculated the Unlevered beta or the asset beta (Beta-A) of the firm = 0.92 , using the formula:

$$\beta(A) = \beta(E)/(1 + (1 - \tau_C) * D/E)$$

Debt Cost Of Capital All Divisions

	Credit	Debt/	Spread to	Debt Cost
<i>Business Segment</i>	Rating	Value	Treasury	Of Capital
Consolidated	A+	42.20%	1.62%	6.2800%
Exploration & Production	A+	46.00%	1.60%	6.2600%
Refining & Marketing	BBB	31.00%	1.80%	6.4600%
Petrochemicals	AA-	40.00%	1.35%	6.0100%

Asset Beta for all divisions

	Total Asset	Percentage asset	Asset Beta
Consolidated	2,62,378	100%	0.92
Exploration & Production	1,40,100	53.39625	0.93
Refining & Marketing	93,829	35.761	1.06
Petrochemicals	28,450	10.843135	0.52

Equity Cost Of Capital of All Divisions

	Credit	Debt/	Debt/	Asset	Equity	Equity
<i>Business Segment</i>	Rating	Value	Equity	Beta	Beta	Cost of capital
Consolidated	A+	42.20%	73.01%	0.92	1.325032	11.28516
Exploration & Production	A+	46.00%	85.19%	0.93	1.40771	11.69855
Refining & Marketing	BBB	31.00%	44.93%	1.06	1.347168	11.39584
Petrochemicals	AA-	40.00%	66.67%	0.52	0.72904	8.3052

WACC For All Divisions

	Equity	Debt/	Equity/	Debt/	WACC
	Cost of Capital	Value	Value	Cost of Capital	
Exploration & Production	11.70%	46.00%	54.00%	6.2600%	8.0544
Refining & Marketing	11.40%	31.00%	69.00%	6.4600%	9.07357
Petrochemicals	8.30%	40.00%	60.00%	6.0100%	6.42961

Figure 3: Calculations for division cost of capital

Also the Beta-A for the EP and RM divisions are 0.93 and 1.06 respectively. Their Percentage asset compared to the entire firm are 53.39 and 35.761 respectively. The Percentage asset for the Petrochemicals department is 10.84

Assuming that the firm asset beta is a weighted average of the asset betas of the various divisions, we get the asset beta for the petrochemicals department to be 0.52

$$0.92 = (0.5339 * 0.93) + (0.3576 * 1.06) + (0.1084 * r_E)$$

$$\beta_E = 0.52$$

Now using the asset beta for the petrochemicals department, we can calculate the equity beta for the division to be 0.729, using the same formula and using D/E = 66.67 % for the petrochemicals. We calculate the equity cost of capital using the CAPM model taking the risk free rate to be 4.66% and the ERPM to be 5% The equity cost of capital comes out to be 8.3052%

Now for the petrochemicals department:

$$r_E = 8.3052$$

$$\frac{E}{V} = 0.60$$

$$r_D = 6.01$$

$$\frac{D}{V} = 0.40$$

$$Petroleum\ r_{WACC} = 0.4 * (1 - \tau_C) * 6.01 + 0.6 * 8.3052 = 6.42961$$