An Examination of Distress

in the Electric Power Industry

Chris Ireland

The Leonard N. Stern School of Business

Glucksman Institute for Research in Securities Markets

Faculty Advisor: Edward Altman

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I. Introduction

Electric power markets worldwide began to deregulate in the mid 1990s. Regulatory acts of the 1980s, such as PURPA in the U.S., had set the stage for independent power producers ("IPPs") to construct power plants and contract directly with utilities and industrials. As markets deregulated and the main industry players established themselves, energy trading became part of the industry. Many of the independent firms began their own "merchant" power business, selling electricity at fluctuating market prices rather than through long term contracts.

Throughout the late 1990s and early 2000s, the power industry demonstrated enormous growth. The enthusiasm that the IPPs showed for power plant construction was only bettered by Wall Street's enthusiasm for financing them. A downturn in the industry in late 2001 resulted in numerous defaults and financial distress[1]. Figure 1 shows the growth in liabilities of the distressed and bankrupt IPPs (all of which were 'distressed' in 2002).

Six firms in the industry defaulted with total liabilities at the time of default of $42B[2] (listed in Appendix B). However, an examination of the other public firms in the industry showed that virtually every other independent power producer was distressed (Appendix B). Figure 2 shows the yield-to-maturity for a selection of bonds of the distressed companies, none of whom defaulted.

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[1] "Distress" – defined as having a yield to maturity at least 1000 basis points over High Yield Average for the year defined by Altman High Yield Bond Default and Return Report

[2] PG&E and Enron have been excluded from the sample because it is believed they are anomalies caused by poor government and fraud, respectively.

Figure 1: Liabilities of distressed and bankrupt IPPs[3]

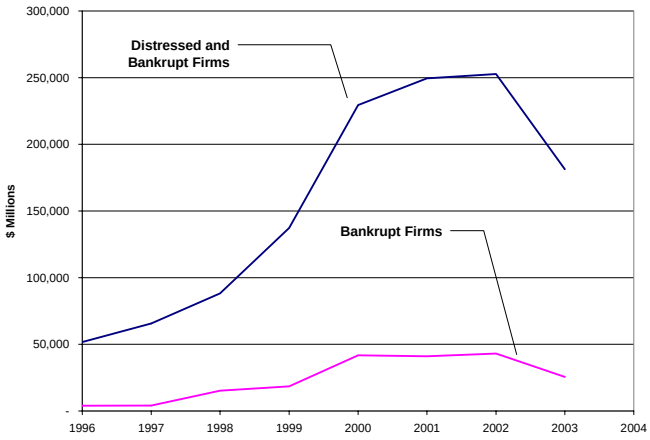
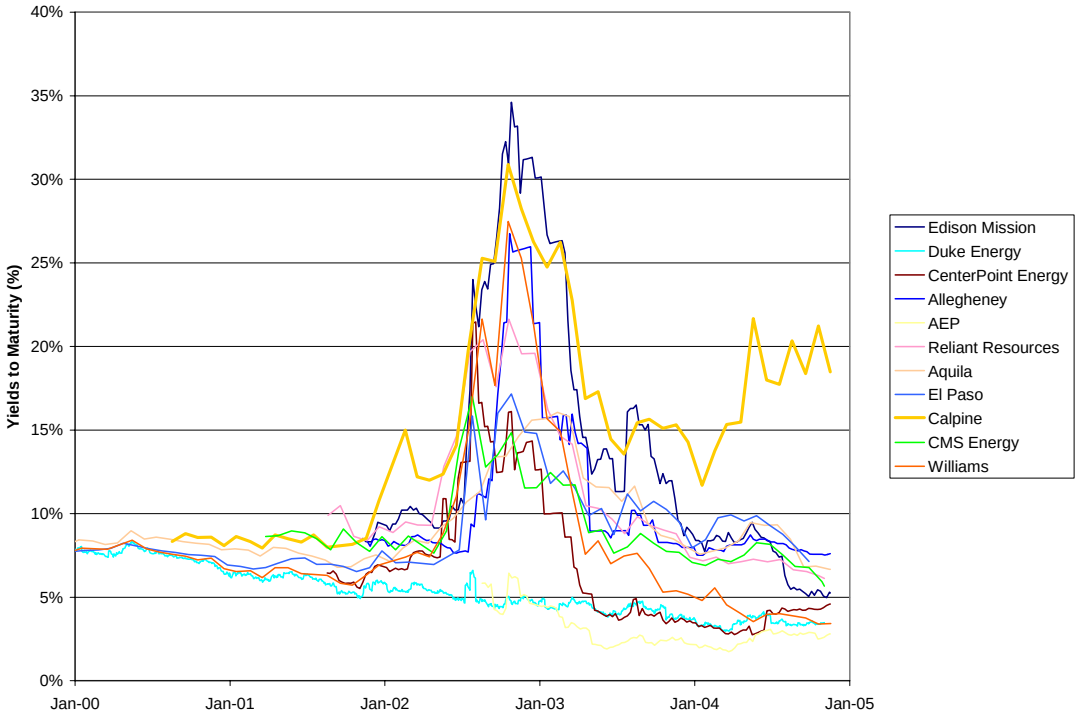


Figure 2: Yields to Maturity for senior unsecured bonds of varying maturities[4]



The goal of this study is to try to determine whether the bankruptcies and financial distress experienced in the power industry could have been predicted using

[3] Source: Compustat

[4] Source: Reuters (www.ejv.com)

known models. Three firms are then examined in detail in an attempt to identify factors not captured by the model to illustrate why some firms declared bankruptcy while others did not. The three firms are found to be similar in terms of common financial ratios. However, the main causes of bankruptcy are found to be relaxed ratings criteria that did not take increased risks into account as the industry changed and failure of management to act when faced with insolvency.

II. Bankruptcy Prediction Models

Beaver (1967) was the first to use ratio analysis as a predictive tool for bankruptcy. His univariate analysis set the stage for other methodologies developed including that by Altman in 1968. Altman improved the technique of Beaver through the use of multi-discriminate analysis. Altman determined five variables that reflected liquidity, profitability, leverage, solvency, and activity. These variables were chosen based on their contribution as univariate predictors, popularity amongst practitioners and correlation with other variables. A later version of the Z-score was developed called the Z'' ("Z double prime"). It was developed specifically for firms in emerging markets, with unique financing structures or where asset turnover is potentially misleading.[5] The final form of the Z-Score and the Z''-score are in Appendix A.

[5] Altman (2000)

Although it was developed in 1968, the Z-score continues to be relevant and accurate as a bankruptcy prediction tool. In one study, it was found that the Type I[6] accuracy over three periods ranging from 1968 to 1997 ranged from 82%-94%.[7]

Another study compared the accuracy of four bankruptcy prediction models: the Z-score, a cash flow "logit" model, a returns analysis model and a variance analysis model, on a sample of firms taken from the years 1980 to 1991.[8] The Z-score performed better than any of the other models resulting in a Type I accuracy of 80% and a Type II accuracy of 71% one period prior to default.

Most bankruptcy prediction studies have focused on firms from a variety of industries, while few have focused on one particular industry. Foreman set out to develop a new model based on bankruptcies of telecommunications firms (CLECS).[9] It is unclear, however, how generic the model is and whether it can be applied to any other firm, or at any other time. Ricci[10] tested the Z-score and a cash flow model[11] as predictors of bankruptcies. The result was that the Z-score correctly classified 87% of bankrupt firms one period prior to bankruptcy however the model only correctly classified 30% of non-bankrupt firms, implying that the Z-scores for the entire telecom industry were very low and practically all firms were predicted to be bankrupt.

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[6] "Type I" accuracy refers to the correct classification of bankrupt firms as bankrupt; "Type II" accuracy refers to the correct classification of non-bankrupt firms.

[7] Altman (2000)

[8] Mossman et al (1998)

[9] Foreman (2003)

[10] Ricci (2003)

[11] Foster and Ward (1997)

III. Application of Bankruptcy Models to the Power Industry

Following the lead of Ricci, the Z"-score was used to try to determine whether the bankruptcies in the power industry could have been predicted. Figure 3 shows the Z''-Score for a sample of bankrupt firms in the power industry. It appears that the Z''-score, in general, declines for the year prior to bankruptcy for this sample. However, the Z''-Score for distressed firms shows the historical range for this industry is low and the bankrupt firms are not significantly different than the distressed firms.

Firms in the industry have continually operated in the "bankrupt" zone of the Z-score. There are two views that could be taken of this:

1) The Z-score is inappropriate as a bankruptcy predictor for this industry. The natures of the firms are sufficiently unique that a model derived from other industries is meaningless.

2) The Z-score is correct, and most firms are, and always have been, likely candidates for bankruptcy. The markets of 2003 and 2004 were simply incredibly permissive and allowed bail-outs of those firms that made it through 2002.

The Z-Score has not proven to be a conclusive indicator of bankruptcy for the power industry. Three firms will be examined in detail in order to illustrate causes of bankruptcy that cannot be captured by a quantitative model. Two of the firms to be examined, AES and Calpine, were distressed but did not default on their loans or become bankrupt. The third firm, NRG Energy, defaulted on loans and subsequently underwent a Chapter 11 reorganization. All three firms' primary business is power generation.

Figure 3: Z''-Score for Bankrupt Firms

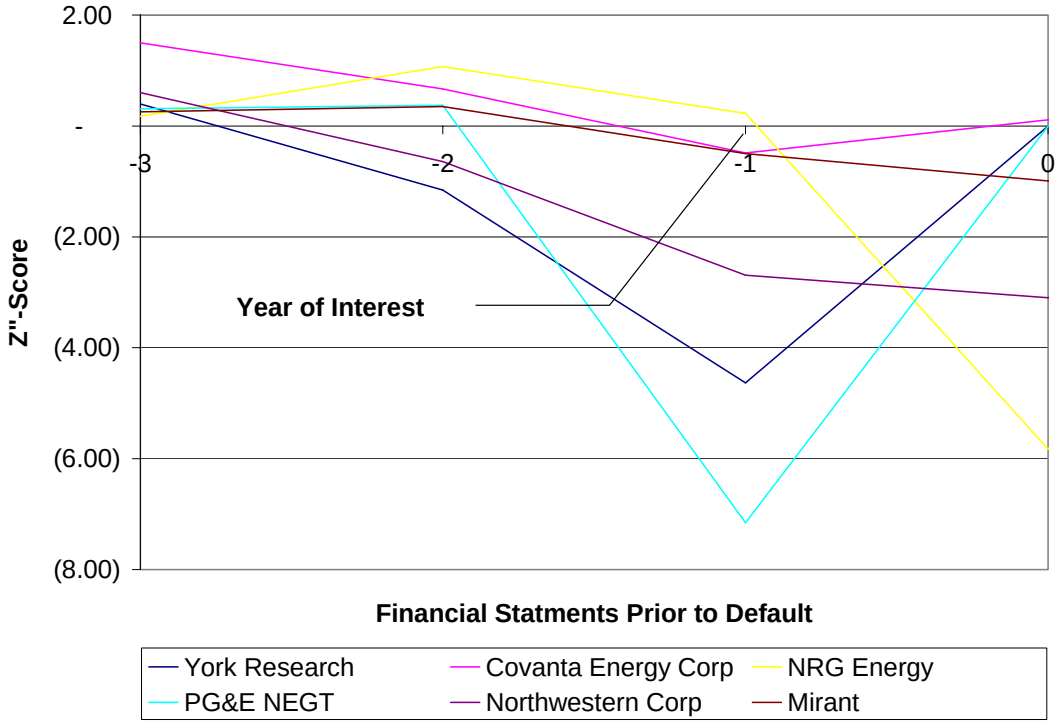
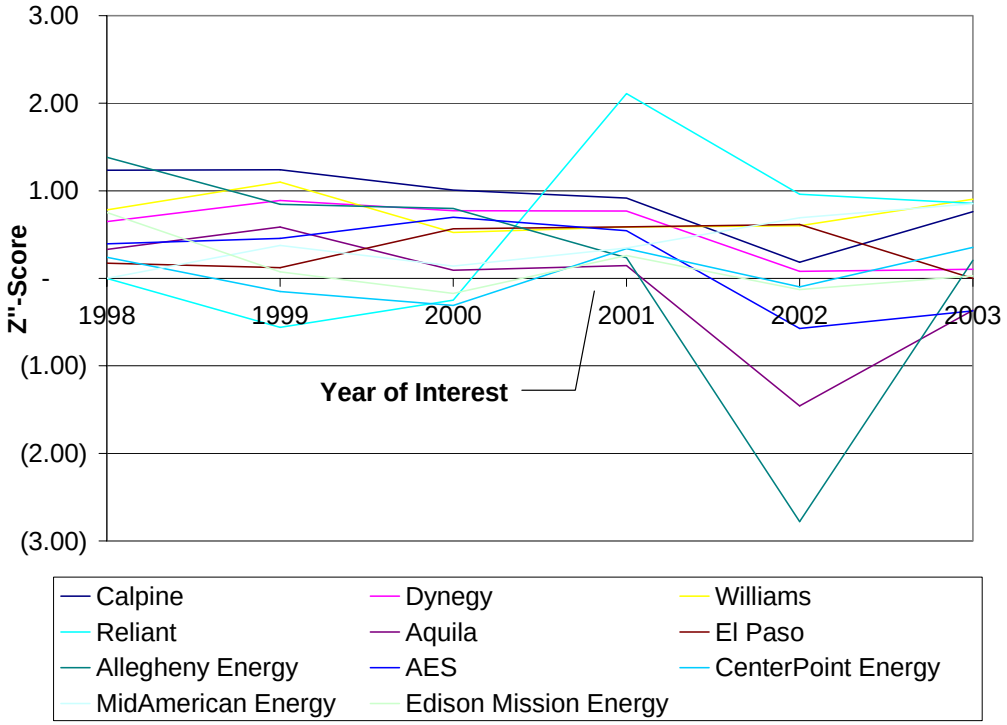


Figure 4: Z''-Score for Distressed Firms



IV. Significant Events in the Industry

Prior to delving into the details of the specific firms, a description is provided of some events that led to the downturn and distress in the power industry. These events are relevant to all three of the firms that are discussed.

California and PG&E

Insufficient electric capacity in California caused power prices there to skyrocket during late 2000 and early 2001. To appease consumers, PG&E was forced to sell power at low fixed prices regardless of the purchase price. PG&E lost $9 billion in a matter of months and filed for bankruptcy in April 2001. California embarked on a 'witch hunt' for the next two years bringing lawsuits against any and all merchant generators accusing them of trading improprieties.

Weather

The winter of 2001/2002 was particularly warm and then was followed by a cool summer in 2002, both of which are bad for energy trading. Cold winters produce high gas prices and high electricity demand resulting in increased volatility. Hot weather produces high electricity prices

Oversupply

During the expansion of the late 1990s, electricity demand grew at an increased rate and merchant generators constructed plants to meet the demand, often with the expectation that aging and polluting coal plants would be shut down. The result of this enthusiasm was an over-supply of capacity and lower margins. In addition, as the natural gas price increased, utilities became hesitant to shut down their coal plants due to lower prices for coal and therefore higher margins on sales.

Enron Bankruptcy

When Enron declared bankruptcy in late 2001, not only did trading counter-parties incur losses, but the result was increased scrutiny of all firms in the power industry and especially those with complicated financial structures. Moody's and S&P downgraded or put on credit-watch many of the merchant generating firms. Bond prices declined immediately for all merchant generating firms.

Worldcom

On July 22, 2002, Worldcom filed for Chapter 11. Although Worldcom had nothing to do with the power industry, it affected the credit markets and made it even more difficult to refinance debt. The ratings agencies reacted, again increasing their scrutiny of firms with a lot of debt and complicated structures.

V. Applied Energy Services Corp (AES)

History

AES was founded in 1981 and originally built power and steam plants for industrial customers. By the mid 1980's, AES was also providing electric utilities with power under long-term contracts that was below the utility's "avoided cost". At this time, the company established its trademark project structure with significant reliance on "non-recourse" project financing.[12]

In the late 1980s, AES began its global expansion into the UK. Early in the 1990s, AES also entered Argentina, Pakistan, China, Australia and Kazakhstan, and later

[12] Non-recourse financing is debt that is held at the subsidiary level and is non-recourse to the parent, meaning that if the subsidiary defaults, the parent is not liable for the debt.

acquired distribution companies and electric generating companies in countries such as Hungary and Brazil. AES was added to the S&P 500 in 1998, and in 2000 the stock price exceeded $70 per share (market cap ~$28B).

AES 1998-2001

AES was in the middle of a period of extreme growth in 1998 operating plants generating 14,500 MW worldwide, with 5,254 MW under construction for a total of approximately 20,000 MW. Most (or all) of this capacity was contracted. AES had become one of the largest of the world's independent power producers.

By year-end 2001, AES had ownership of over 50,000 MW of capacity, an annual compounded growth of 60% since 1998. Assets had grown to $36B, with total debt of $22B.

Table 1: Breakdown of AES Net Income

	% of Pre-tax Income	
	2001	**2000**
Contract Generation	31%	31%
Competitive Supply	9 %	21%
Large Utilites	51%	46%
Growth Distribution	9%	2%

AES, in 2001, had diversified into four business units Growth Distribution, Large Utilities, Contracted Generation and Competitive Supply. Growth Distribution represents generation and transmission assets in growing (emerging) economies. Large Utilities represents five integrated utilities located in the US, Brazil and Venezuela. Contracted Generation is their traditional business where power is sold forward through long-term

contracts and comprised 42% of capacity in 2001. Competitive supply includes all plants with less than 75% of its capacity contracted or with power contracts less than 5 years and comprised 38% of capacity in 2001. Competitive supply is used here as a proxy for merchant power, since it is hedged incompletely or only short-term. The collapse of UK and US electricity prices resulted in competitive supply making up a smaller portion of AES revenues in 2001 compared with 2000.

Table 2: Overview for AES (Consolidated), 1998 vs 2001

	YE 1998	YE 2001
Number of Projects	96	179
Total MW	145,00	50,764
MW in construction or pending acquisitions	5,254	7,500
EBITDA (millions)	929	2,827
LTD/Assets	54%	62%
EBITDA to Int Exp	1.7x	2.0x
Total Debt to EBITDA	6.0x	8.0x
Recourse Debt to EBITDA	1.8	1.9
Corporate Unsecured Rating	BB	BB

Capital Structure

AES is organized as a holding company that is parent to over 100 international subsidiaries. AES has always maintained a "project finance" structure whereby each subsidiary is financed by project level debt that is non-recourse to the parent company. The project level debt is secured by the assets of the subsidiary which typically consists of a single power plant. These subsidiaries are financed with anywhere from 60%-85% debt and the remainder equity. At the parent level, AES supplies the "equity" to the projects through traditional equity and unsecured, recourse debt. Although the end result

is a firm that is highly levered, it is rationalized that the parent level debt is secured by the residual cash flows from numerous diversified projects.

Some argue against a project finance structure because it is intrinsically expensive. As a firm grows, new projects do not take advantage of the lower cost of borrowing that a large firm with corporate level debt enjoys. The result is higher interest costs and more frequent transacting costs. However, a benefit to this structure is its inherent optionality. Should the project not perform as planned, the parent firm has the option to "put" the project back to the lenders without direct recourse (besides reputational damage).

On a consolidated basis, AES has maintained a ratio of liabilities to assets of approximately 85%. Non-recourse debt increased from 33% to 40% of assets from 1998 to 2001, perhaps as a result of lower interest rates and thus a higher capacity for projects to take on debt or alternatively, due to the lending markets newfound comfort in the power industry.

AES is one of few firms that provides both a consolidated and an unconsolidated balance sheet, which allows some insight into just the parent corporation without the subsidiaries. On an unconsolidated basis, the amount of recourse debt on AES's Balance Sheet increased from 40% to 49% of assets, or from 50% to 67% of Investments in Projects from 1998 to 2001. AES (parent) has let its current assets grow in the form of notes receivable from subsidiaries indicating that non-performing subsidiaries are being funded by AES. The net result is that AES has increased its leverage as it has expanded.

Table 3: AES Corp - Balance Sheet (Consolidated) - 1998/2001

Consolidated Balance Sheet (AES)			Common Size	
	1998	2001	1998	2001
Current Assets	1,254	4,653	12%	13%
Net PP&E	5,545	23,434	51%	64%
Investments in Projects	1,933	3,100	18%	8%
Other Non-Current Assets	2,049	5,549	19%	15%
Total Assets	10,781	36,736	100%	100%
Current Liabilities	1,976	5,041	18%	14%
Minority Interest	-	1,530	0%	4%
Non-Recourse Debt	3,597	14,673	33%	40%
Recourse Debt	1,644	5,891	15%	16%
Other Non-Current Liabilities	1,770	4,062	16%	11%
Total Liabilities	8,987	31,197	83%	85%
Retained Earnings	1,120	2,809	10%	8%
Total Equity	1,794	5,539	17%	15%
Total Liabilities and Equity	10,781	36,736	100%	100%

Table 4: AES Corp - Balance Sheet (Unconsolidated) - 1998/2001

Unconsolidated Balance Sheet (AES)			Common Size	
	1998	2001	1998	2001
Current Assets	446	3,172	11%	26%
Net PP&E	-	-	0%	0%
Investments in Projects	3,390	8,697	83%	72%
Other Non-Current Assets	244	172	6%	1%
Total Assets	4,080	12,041	100%	100%
Current Liabilities	65	611	2%	5%
Minority Interest	-	-	0%	0%
Non-Recourse Debt	-	-	0%	0%
Recourse Debt	1,644	5,891	40%	49%
Other Non-Current Liabilities	577	-	14%	0%

Unconsolidated Balance Sheet (AES)			Common Size	
	1998	2001	1998	2001
Total Liabilities	2,286	6,502	56%	54%
Retained Earnings	1,892	2,551	46%	21%
Total Equity	1,794	5,539	44%	46%
Total Liabilities and Equity	4,080	12,041	100%	100%

Table 5: Debt coverage ratios for AES (recourse debt)

	1998	1999	2000	2001
Parent-EBITDA	285 (est.)		871	1038
Int Expense Net	48		133	240
Interest Coverage	5.9x		6.5x	4.3x
Recourse Debt	1,644		4,694	5,891
Debt/EBITDA	5.8x		5.4x	5.7x

AES reports its Operating Cash Flow to Parent (also called parent-EBITDA).[13] This is a measure that is relevant to the recourse debt, whereas Cash Flow from Operations (CFO) or other 10-K data will generally be consolidated and relevant only to total recourse and non-recourse debt.

Table 5 shows that Debt/EBITDA has remained relatively constant but the interest coverage ratio declined in 2001.

[13] Parent-EBITDA was not stated in 1998 or 1999 and has been estimated for 1998 as Dividends from Subsidiaries and Affiliates.

Timeline

The following contains a timeline summarizing AES path into financial distress, and the actions that were taken to restructure.

Dec 2001	AES bond prices decreased with the rest of the industry over fears of another Enron (see Figure 5 for stock and bond prices).
Jan-Jul 2002	Political turmoil in South America had caused considerable depreciation in the Brazilian, Venezuelan and Argentinian currencies. AES had approximately 30% of its consolidated revenues and 30% of its gross margin generated in South America. In Argentina, the government had rescinded its energy policy such that all payments would be made in Argentine pesos rather than USD and removal of pesos from the country would be limited. In the US, the spark spread (the spread between power prices and natural gas cost) had declined substantially from its highs in 2000. In the UK, the power markets had collapsed, and cash flows from the AES Drax plant would be significantly reduced. AES announced that it expected a decrease in distributions to the parent corporation of approximately $100 million (10% of parent level EBITDA).
May 2002	Downgrades of Calpine, Mirant, and Dynegy caused bond prices to decrease further. There are speculations of liquidity concerns due to debt maturing in December 2002. AES announces that it is in negotiations to sell subsidiary CILCORP generating $540MM of cash.
July 2002	Worldcom filed for Chapter 11. AES bonds decreased to the low levels that would remain until October (~$0.40).
Jul-Oct 2002	AES has $300 million in Senior notes coming due December 15, 2002.

In addition, it has an $850 million revolver coming due March 2003, and $200 million in notes in Jun 2003.

Following Enron, and Worldcom, the credit markets are particularly tight. Most firms in the industry are trying to refinance current debt. After a number of years of expansion, there had been little contemplation of credit drying up.

There is speculation whether AES has the liquidity to repay the maturing debt particularly with cash flows declining. AES bonds steadily decline in price to lows of $0.30.

Jul 2002 Announces sale of subsidiary for $240 million (New Energy). This is well received but liquidity is still an issue and bond prices remain low.

Oct 24, 2002 AES proposes a refinancing plan. All debt coming due in 2002, and early 2003 will be refinanced with new 10% senior notes due in 2005 and a $1.6 million credit facility.

It is proposed that holders of the $300 million notes due in December 2002 will receive 50% of the face value in cash, and another 50% in new notes. Receiving $0.50 immediately is a good deal for the bond holders since the bonds are currently trading around $0.30. Bond prices increase substantially.

Holders of the $200 million notes coming due in June 2003 will exchange at face value for the new notes, which are more senior and have a higher coupon. It is not clear how much more these holders gain from this exchange.

The $1.6 million credit facility will repay the revolver and several loans of AES subs. Half of it comes due in Nov 2004, and half in 2005.

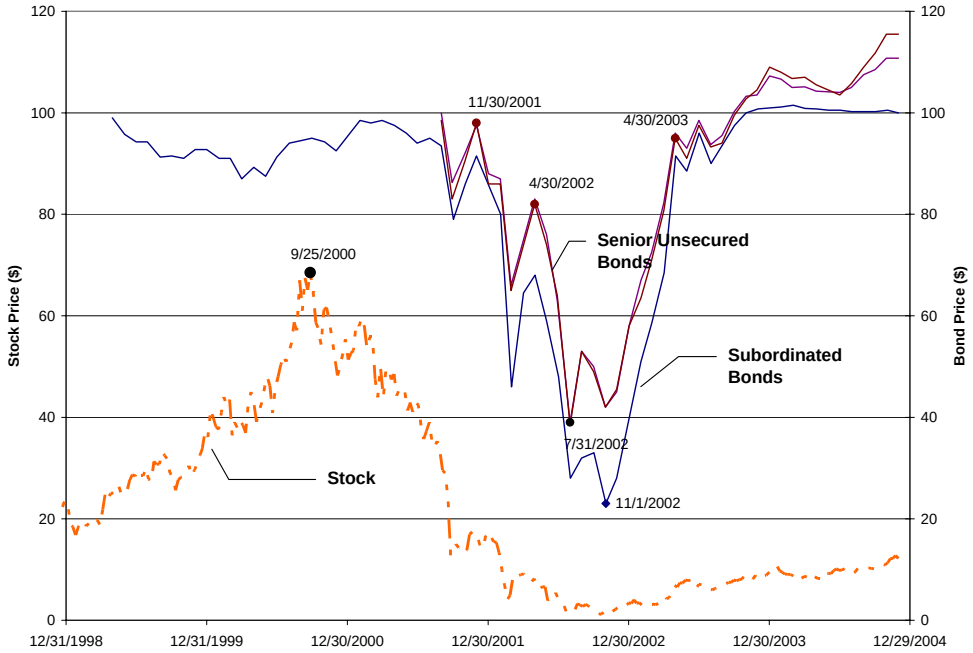
Further details are given in Appendix C

Nov 2002 Announces sale of CILCORP for $1.4B, generating $540 million cash.

Dec 13, 2002	The refinancing plan is accepted. The only change is that the $300 million noteholders will receive 65% cash and 35% new notes, further improving their deal.
May 2003	AES secures a $1.8 billion private placement to pay off part of credit facility from December and extend maturity of some notes coming due 2008-2011. The new debt matures 2013 and 2015.
2003	Announced $1.0 billion of asset sales. Refinancing of more debt, which included extended maturities and consolidating all short term loans into a $700 million term loan due 2008. Also completed an equity offering of $337 million.
2004	AES continues to sell assets. Refinances high interest rate debt with longer term, lower coupon notes. Repays December credit facility. Extends term of revolver to 2007.
2005	Stock is trading at above $16, up from lows of $2 in 2002. Bonds are trading at or above par.

Figure 5 shows the stock and bond prices for AES from 1998 to 2004. The events described were clearly reflected in the market prices of these securities. Bond prices reacted abruptly as AES refinanced and threats of insolvency were removed. Stock prices did not change as drastically, but began increasing when the bonds returned to par.

Figure 5: Comparison of AES Stock and Senior Unsecured Bond[14] prices



Further details of AES' restructuring are included in Appendix C.

VI. Calpine Corporation

Overview

Calpine was founded in 1984 by Peter Cartwright to participate in the independent power industry. By 1992, Calpine had total assets of $55 million. Their business strategy was to build the most efficient plants and become the low-cost producer in any given market. Peter Cartwright is a solid believer in electricity deregulation and believes

[14] AES bond prices refer to (1) Senior Unsecured Bond Due 2011, 8.875% Coupon and (2) Senior Unsecured Bond Due 2008, 8.5% Coupon and (3) Senior Subordinated 8.375% Coupon, due 2007

that the consumer will ultimately receive lower prices. His goal, as of 2001, was to build 70,000 MW of capacity entirely of highly efficient gas fired power plants[15].

Calpine vertically integrated by purchasing natural gas resources, turbine parts manufacturers, and a trading organization. In addition, significant economies of scale and expertise have been developed in construction and plant operations.

CPN: 1998-2001

Between 1998 and 2001, Calpine had grown at a compounded annual rate of 130% (assets) and 80% (capacity in operation and construction). Calpine grew their installed MW base from 2,200MW to 12,000MW between 1998 and 2001 through an aggressive construction and acquisition strategy. As of 2001, Calpine had an additional 14,000MW under construction or pending acquisitions. Their goal was to reach 70,000 MW by 2005.

In 1998, virtually all of its capacity was contracted. By 2001, Calpine had 65% of its capacity sold forward, or otherwise contracted, with the remaining amount unhedged, merchant capacity.

Table 6: Overview for Calpine 1998 and 2001

($millions)	YE 1998	YE 2001
Number of Projects	22	54
Total MW	2,065	12,089
MW in construction or pending acquisition	2,206	14,142
EBITDA	$255	$1,595
LTD/Assets	68%	60%

[15] Wall St. Transcript, 2001.

($millions)	YE 1998	YE 2001
EBITDA to Int Exp	2.9x	9.7x
Total Debt to EBITDA	4.3x	8.0x
Total Recourse Debt to EBITDA	3.7x	8.0x
Corporate Unsecured Rating	BB+	BB+

Capital Structure

Calpine, unlike AES, holds most of its debt at the corporate level. Although Calpine has some debt that is titled non-recourse or project level, it has provided a corporate guaranty, meaning that the debt will be covered by Calpine on default. In addition Calpine has "cross-default" provisions on its non-recourse debt, meaning that default at the project level will result in default of the parent, or, default of the parent will result in default at the project level. Calpine plainly states these cross-default provisions in both its 2000 and 2001 10-K and therefore analysts treat all of Calpine's debt as being recourse debt.

Table 7: Calpine Corp. - Cash Flows and Debt Service

	1998	1999	2000	2001
EBITDA	282	433	1,016	1,600
Int Expense	96	103	75	165
Total Debt	1,216	2,262	4,757	12,728
Interest Coverage	2.9x	4.2x	13.5x	9.7x
Total Debt/EBITDA	4.3x	5.2x	4.7x	8.0x

Much of Calpine's recent construction has been financed by two loans called CCFC I and CCFC II (Calpine Construction Finance Corporation) that are secured by the assets under construction until completion at which time corporate debt will be used to take out the construction revolver.

Calpine has maintained a capital structure with approximately 85% liabilities to assets from 1998 through 2001. This leverage ratio has not changed as the firm moved from contracted assets to a blend of contracted and merchant plants.

Table 8: Calpine Corp- Balance Sheet - 1998/2001

Balance Sheet (CPN)			Common Size	
	1998	2001	1998	2001
Current Assets	209	4,007	12%	19%
Net PP&E	1,094	15,385	63%	72%
Investments in Projects	221	378	13%	2%
Other Non-Current Assets	205	1,539	12%	7%
Total Assets	1,729	21,309	100%	100%
Current Liabilities	122	3,228	7%	15%
Minority Interest	-	47	0%	0%
Non-Recourse Debt	114	3,393	7%	16%
Recourse Debt	951	9,553	55%	45%
Other Non-Current Liabilities	255	2,078	15%	10%
Total Liabilities	1,442	18,299	83%	86%
Retained Earnings	118	1,196	7%	6%
Total Equity	287	3,010	17%	14%
Total Liabilities and Equity	1,729	21,309	100%	100%

Calpine provides, as part of its financial statements EBITDA as a proxy for cash flow for debt and fixed charge coverage (Table 7). Calpine's total debt to EBITDA ratio has increased substantially from 2000 to 2001 and is now at a high of 8.0x EBITDA. This may be due to the massive construction program it is undertaking which requires it to take on debt for assets that are not yet generating revenues. Interest coverage as of 2001 remains substantial at 9.7x.

Timeline

The following timeline summarizes the events that lead to Calpine's distress and the actions taken to maintain solvency.

Dec 2001	Fitch downgrades Calpine from BBB- (lowest investment grade) to BB+ (highest non-investment grade), bond prices decline, and stock price is declining from ~$20 (see Figure 6). Calpine issues $1.2B in convertible senior notes. And repurchases $315 million of zero coupon bonds.
Jan 2002	Calpine secures a $1B credit facility. In addition to their $400M facility that comes due May 2003, there is little risk of bankruptcy for the near term although bond prices decline to $0.80. They announce that only the 14,000MW that are currently under construction will be completed and other development will be put on hold, resulting in reduced capital expenditures of $2.0B for 2002. To put this to scale, Calpine had plans to have a total of 70,000 MW in operation by 2005, up from the current 11,000 MW. Calpine renegotiates gas turbine purchases reducing capital expenditures by $1.2B in 2002 and $1.8B in 2003.
Feb-Mar 2002	In mid-February there were concerns that January's $1B credit facility was not going to close (stock price drops to $6.80). In March it was announced that they had secured a $1.6B credit facility, $1B of which would come due in May 2003 along with their existing $400M credit facility and the remainder in 2005 (stock price rebounds to $12.83). Bond prices drop to $0.73 in mid Feb and rebound to $0.80 but remain below the $1 from late 2001.
Apr 2002	Sells power and plants to Wisconsin Public Service (WPS) and

	renegotiates existing contracts with California DWR. Issues equity for a total of $800MM. Bond prices rise to $0.80 and the stock hovers around $12.
Jul-Aug 2002	Expectations of a cool summer lead to revised EPS estimates, and renewed liquidity concerns. Calpine is downgraded along with Dynegy and Mirant late June 2002 with NRG in July. The summer ultimately is quite cool and earnings are low. Bond prices in August drop to $0.43 with implied yields to maturity of above 25%. Stock prices drop to $3.40.
Sept-Dec 2002	Stock prices continue to plummet to below $2 and are valued merely at the option value of the plants. Bond prices fall to the low $0.30's with yields above 30%. In response Calpine manages to sell several assets including a number of natural gas assets, complete a number of project financings, and monetize some of its Canadian assets through an income fund.
Jan-March 2003	The main obligations coming due are $400MM of a $1B revolver in May 2003 and $1B in October 2003 for its CCFCI construction facility. CCFCI is secured by approximately $3.0B in assets, and it is likely that the banks will roll this over. Calpine has not been as successful as planned in selling assets, or raising money through contract securitizations, sales leasebacks, and project financings. There are $3.5B in obligations coming due n 2004. Despite the dire news, bond prices have increased to approximately $0.50 perhaps due to other industry participants' refinancings giving some glimmer of hope.
May-Jul 2003	June 24 Calpine announced that they had signed a termsheet for refinancing a $1.0B revolver with another $1.0B revolver. June 27 Calpine announced that instead they were looking for a $1.8B

private placement. July 11 they announced $3.3B of refinancing (summarized in Appendix D).

Simultaneously with the $3.3B refinancing, Calpine secured a new $500MM working capital revolver. $200MM of which is a four year term loan and $300MM is a line of credit which was undrawn as of year end 2003.

Following this event, bond prices moved up to high $0.70s and low $0.80s with yield of ~13-15%.

Aug-Dec 2003

Throughout the rest of the year, Calpine continued to sell projects and monetize assets, albeit at a slow pace.

In Nov 2003, Calpine issued another $1.3B of debt to repay debt coming due. Part of the new debt includes $660MM of new convertibles (with a lower conversion price and a longer maturity than prior issues). The remainder of the offering consisted of $900MM of 2011 notes.

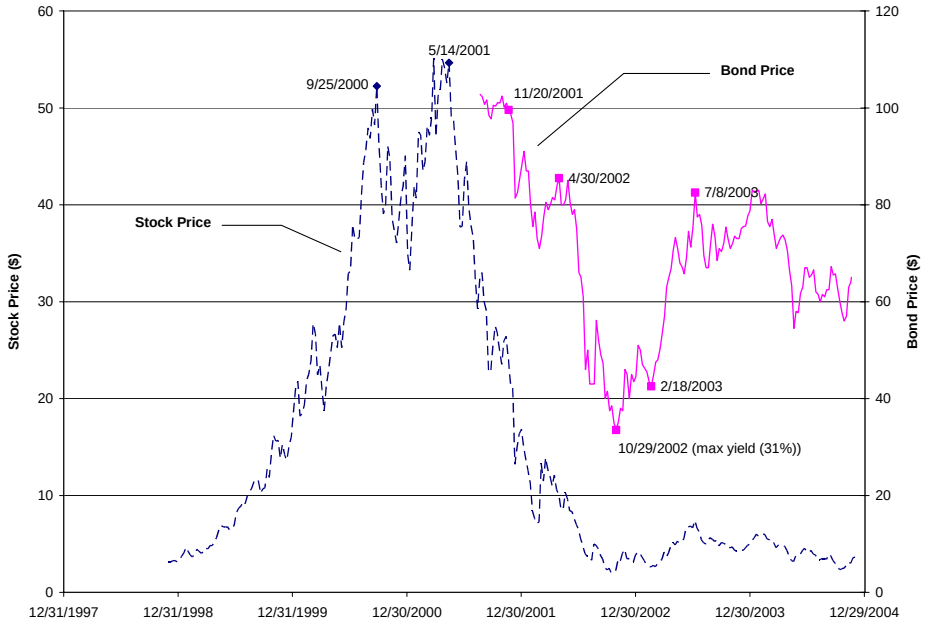
At this point, the end of 2003, Calpine has removed all impediments to insolvency for the short term. In 2004, the largest item coming due is the CCFCII construction loan which is secured against 14 plants under construction with a value substantially higher than the face value of the loan. Their bonds are trading at around $0.80 implying a yield of approximately 13%.

2004-2005

Calpine has continued to issue debt, monetize and sell assets. There is speculation that they are nearing their debt capacity and the power markets fail to improve. Senior Unsecured bonds are currently (Mar 30, 2005) trading at approximately $0.70, implying a yield of 16% (Sr. Unsecured, 8.75% due 2011), and the stock is trading at an option value of $2.60 down from its highs of $55.

Figure 6 shows the stock and bond prices for Calpine from 1998 to 2004. The events described are reflected in the market prices of these securities.

Figure 6: Comparison of Stock and Unsecured Bond Prices for Calpine[16]



Calpine has shown considerable skill in accessing the capital markets and has used the flexibility that it had maintained in its capital structure as of 2001 to generate cash and maintain solvency. It has still not recovered because of the overcapacity that remains in the US power industry. AES on the other hand had a considerable amount of international exposure of both contracted and uncontracted assets that were uncorrelated

[16] Calpine Senior Unsecured Bond, 8.5% Coupon, due 2011

with the US markets and to that extent were able to recover. It is questionable what the next few years will bring for Calpine.

VII. NRG Energy Inc.

History

NRG Energy Inc. began business in 1989 as a wholly owned subsidiary of Northern States Power (NSP). On June 5, 2000, NRG completed its initial public offering. In August 2000, NSP merged with New Century Energies to become Xcel Energy. Xcel owns interests in a number of non-regulated businesses, the largest of which is NRG. In March 2001, Xcel owned 74% of the common stock of NRG which represented 96.7% of the voting shares. On June 3, 2002, Xcel completed its exchange offer for the 26% of NRG's shares that had previously been publicly held. Xcel purchased the remainder of the shares due to their low price and with the intent of injecting more equity into NRG to maintain its investment grade credit rating.

NRG 1998-2001

In the 1990's NRG pursued a strategy of growth through acquisitions. Starting in 2000, NRG added the development of new construction projects to this strategy. The strategy required significant capital much of which was satisfied with third party debt. As of Dec. 31, 2001, NRG had 9.4B$ of debt on its consolidated balance sheet including $4.0B of corporate debt and $5.4B of consolidated project debt. This is an increase from Dec 31, 1998 where NRG had just over $500MM of both non-recourse and recourse debt on its balance sheet. During that time, the generating capacity owned by NRG had increased from 3,300MW to over 20,300 MW.

In the 1998 Annual Report, NRG first announced that several of their new projects would operate on a "merchant" basis, including projects in Australia and the US. The announced merchant projects would amount to approximately 50% of NRG's capacity in 1998. By 2001, NRG had over 20,000 MW in operation and over 3,000 in development. Of this, approximately 45% was merchant. In 2000, NRG also added new construction to their business activities.

Table 9: Corporate Statistics for NRG, 1998 vs 2001

	YE 1998	YE 2001
Number of Projects	40	75
Total MW	3,300	20,733
MW in construction or pending acquisitions	-	3,460
EBITDA (millions)	$83	$954
LTD/Assets	48%	65%
EBITDA to Int Exp	1.63x	2.15x
Total Debt to EBITDA	7.6	8.8
Recourse Debt to EBITDA	6.2	3.1
Corporate Unsecured Rating (S&P)	BBB-	BBB-

NRG 2001-2002

In November 2001, NRG was negotiating the purchase of four coal plants for $1.5B. Industry analysts were in favor of the transaction:

> *"We believe NRG can achieve solid long-term compounded annual EPS growth of 15%..... We are confident that NRG can achieve our conservative growth targets given the quality of its assets, hedging strategy, fuel diversification, risk management skills and current pipeline of projects."*[17]

[17] UBS Warburg Equity Research, Nov. 30, 2001

In December 2001, following the bankruptcy of Enron, Moody's placed NRG's Senior Unsecured notes on review for a potential downgrade citing the effect of the aforementioned acquisition as the reason. In an effort to maintain an investment grade credit rating, Xcel purchased the 26% outstanding shares of NRG and provided a $500MM cash infusion.

During July and August 2002, NRG's credit rating was lowered from BBB-, to BB and then B by Standard and Poor's and to Baa3 to B1 by Moody's.

NRG had provided corporate guarantees for the debt of some of its projects with the stipulation that cash collateral or letters of credit would be provided if its credit rating were to be reduced by Standard and Poor's or Moody's to below investment grade. The credit downgrade caused a requirement for $1.85B of collateral to be posted immediately. Collateral was needed to cover project level debt service reserve accounts, trading/marketing activities, and a Contingent Equity Guarantee on a construction revolver.

In November 2002, NRG Energy and its subsidiary NRG NorthEast filed petitions for Chapter 11. NRG defaulted on the payment of $127.6MM of interest on recourse debt issues and $138.2MM in interest and principle payments on non-recourse debt in 2002 and early 2003.

Capital Structure

The assets of NRG grew at a compounded rate of 120% during the period 1998-2001. In 1998, NRG's Balance Sheet looked more like that of a passive investor having

62% of its assets as non-controlling (<50%) investments in projects accounted for using the equity method. Liabilities made up 55% of assets and equity the remainder.

In 2001, liabilities had increased to 83% of assets, which was typical of other firms in the industry. Projects were more often being financed by non-recourse debt. NRG had begun to construct its own projects, and generally owned a majority stake in the projects.

Table 10: NRG Energy - Balance Sheet 1998/2001

Balance Sheet (NRG)			Common Size	
	1998	2001	1998	2001
Current Assets	92	1,187	7%	9%
Net PP&E	205	9,432	16%	73%
Investments in Projects	801	1,051	62%	8%
Other Non-Current Assets	196	1,224	15%	9%
Total Assets	1,293	12,895	100%	100%
Current Liabilities	51	1,951	4%	15%
Minority Interest	14	68	1%	1%
Non-Recourse Debt	113	4,871	9%	38%
Recourse Debt	381	2,972	29%	23%
Other Non-Current Liabilities	156	795	12%	6%
Total Liabilities	714	10,657	55%	83%
Retained Earnings	130	635	10%	5%
Total Equity	579	2,237	45%	17%
Total Liabilities and Equity	1,293	12,895	100%	100%

Some might argue[18] for the inclusion of a pro-rata share of assets and liabilities rather than the equity method of accounting, however, doing so does not change the ratios substantially. For example, the total liabilities on the balance sheet for 2001 would increase by $2.2B and the assets by $3.6B.

An "adjusted CFO" measure was used as a proxy for cash available to service interest payments. It can be seen that the results for 1998 and 1999, while NRG was a wholly owned subsidiary of NSP (now Xcel), are nonsensical. Moreover, NRG's interest coverage ratio had decreased and the debt/CFO had increased from 2000-2001. NRG had a number of assets that did not perform and as such were restricted from distributing cash to their parent. Also, this is a reflection of the exposure to the declining merchant markets.

Table 11: NRG Energy - Interest Coverage Ratio

($millions)	1998	1999	2000	2001
adjusted CFO	$47	$56	$748	$752
Int Exp	$50	$93	$294	$443
Total Debt	$520	$2,346	$3,803	$9,173
Int Coverage	1.0x	0.60x	2.54x	1.7x
Debt/ adjusted CFO	11x	42x	5.1x	12.2x

Timeline

The following timeline provides a summary of events from late 2001 through NRG's default and bankruptcy filing.

[18] Singleton (2000)

Oct 2001	Morgan Stanley has a buy rating with a 12 month price target of $42 from the current $17. Buy reduced to Hold in December as it lowers rating on entire industry.
Nov 2001	NRG announces that it will purchase 2500MW from First Energy for $1.5B. UBS reiterates a Strong Buy.
Dec 2001	Moody's placed NRG credit rating on review (currently at Baa3 – the lowest investment grade). Incidentally, S&P 'confirmed' a BBB- rating at this time. A downgrade to below investment grade would result in NRG having to post approximately $960MM of collateral within 30 days due to guarantees posted by NRG parent to its subsidiaries. The guarantees are required for: $200MM for debt service coverage, $400MM required for power marketing activities, and $360MM for the Contingent Equity Guarantee that goes with its corporate revolver which could increase by the end of 2002 as NRG draws down the revolver bringing the total potential collateral required to $1.85B.
Dec 2001	Xcel as primary shareholder sought to preserve NRG's investment grade rating and contributed $500MM to NRG.
Feb 2001	A plan is announced to maintain NRG's credit rating that includes primarily a cash influx from Xcel but also non-aggressive plans to begin selling assets
June 2002	Xcel buys remaining 26% of NRG shares. On June 25, 2002, S&P downgraded Xcel to from BBB+ to BBB-, NRG unsecured bonds begin downward decline.
July 2002	July 1 S&P affirmed the senior unsecured debt of the NRG Energy unit at BBB-, S&P's lowest investment grade, but took it off CreditWatch-Positive where the company was put Feb. 11, 2002, after Xcel announced

	plans to reacquire it. S&P's outlook on NRG is now negative. There are also other downgrades including Dynegy Mirant and Calpine[19]
July 2002	Worldcom files Bankruptcy July 21, 2002.
	S&P and Moody's downgraded NRG to below investment grade on July 26 and July 29 respectively, thus resulting in immediate collateral call of approximately $1.0B (never actually posted).
	Xcel actually has cross-default provisions with NRG and one of the reasons they offer to eventually offer to contribute cash to settle creditor's bankruptcy suitspony up money. Xcel manages to renegotiate this term in Aug 2002.
Aug 7, 2002	NRG downgraded again to B by S&P
Sept 2002	Sept, 16, 2002 NRG didn't make interest payments due resulting in the immediate acceleration of approximately $1.85B.
Nov 22, 2002	NRG files Chapter 11
Feb 2003	An additional $1.0B of payments accelerated under corporate revolver.
Mar 2003	It is agreed that Xcel will pay NRG creditors $640MM for release of any and all claims against it.

[19] Power Market Week, July 2002

Figure 7: Stock and Unsecured Bond Prices for NRG Energy (prior to Bankruptcy)[20]

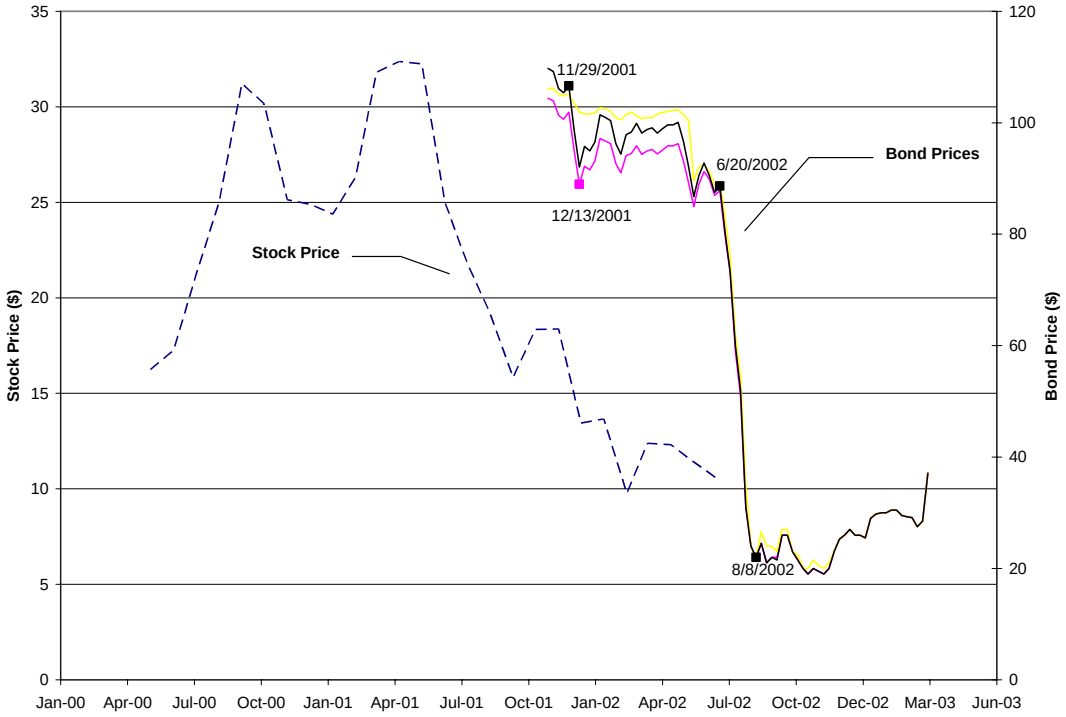


Figure 7 shows the stock and bond prices for NRG from 1998 to 2004. As the events unfolded their effects were reflected in the market prices of these securities.

On Re-Emergence from Bankruptcy

The Plan of Reorganization for NRG Energy Inc. resulted in recovery of 50% of Unsecured Claims (Class 5) and 43.9% of PMI Unsecured Claims (Class 6) for total relief of $3.3B. In addition, Xcel Energy was accused of numerous misdeeds and settled all suits with the contribution of $640MM to the reorganized NRG Energy.

NRG re-emerged from bankruptcy Dec 3, 2003. The share price increased from $24 to $35 (as of April 2005) giving a market capitalization of $3.5B. The Dec 31 2003

[20] Source: Thomson - Datastream

Balance Sheet is shown compared to the BS from 2001 in Appendix E. They currently have interests in 72 power projects totaling 18,200MW.

Balance sheet changes from year-end 2001 and the emergence from Chapter 11 in 2003 include:

- An addition of $500MM of equity in early 2001 by Xcel
- A payment of $640MM in 2003 by Xcel to settle lawsuits and allegations
- Asset sales, and a writedown of assets of over $3 Billion
- forgiveness of over $3 Billion in debt

VIII. Discussion

Overview

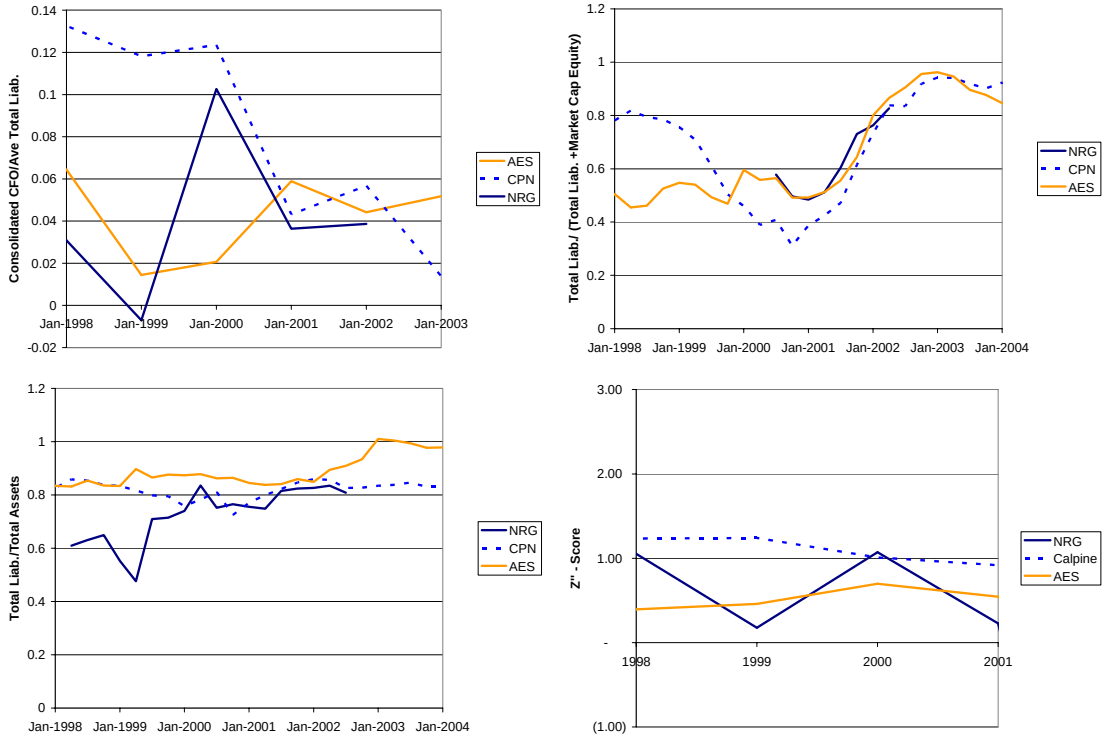
AES, Calpine, and NRG were compared to illustrate the complexities within the unregulated power sector particularly during the year 2002. AES participates primarily in international markets and its financial distress was caused by crises in South America, UK, and the US. Calpine operates natural gas-fired power plants in the United States and had to scale back its massive development plans due to weak fundamentals in that market. NRG operates worldwide however its exposure to the US market combined with a capital structure contingent on ratings caused sudden and unpredictable insolvency.

Other factors that differentiate the firms are discussed below.

Financial Analysis

Financial data is presented for the period from 1998 onwards for the three firms in order to compare the structure and risk associated with each of the firms.

Figure 8: Comparison of financial measures for Calpine, AES and NRG



It can be seen from the upper left chart in Figure 8 that in years 2000 and 2001, the CFO/Total Liabilities of Calpine and NRG are approximately the same. Inconsistencies and generally poor reporting in earlier years may account for the variability between firms. The market capitalization ratio (upper right), shows that all three firms were similarly capitalized, with Calpine relatively less levered during 2000 when stock prices were at their peak. The firms have virtually identical book capitalization ratios also (lower left). And finally, the Z''score shows again that these three firms have remarkably similar values. NRG exhibits more volatility over the period which could be in part due to their changing capital structure (full ownership and consolidation). It is interesting that the Z''-Score has not increased from 1998 to 2001 as the industry became more mature and the risk characteristics of the business increased as firms began selling uncontracted, merchant power.

Table 12: Operating Comparison

	AES	Calpine	NRG
Merchant Capacity	38%	35%	45%
% of Operating Capacity in Construction	15%	115%	17%

A comparison of operating makeup of each company is shown in Table 12. As of year end 2001, NRG has an estimated 45% of its capacity as merchant generation, whereas AES and Calpine have somewhat less. This would have had a significant effect on NRG as the US power market collapsed. The more capacity that was contracted, the more able to withstand the downturn a firm would be. Calpine on the other hand, has a massive amount of capacity in construction, with 14,000 MW in construction and 12,000 MW operating. One would expect the capacity in construction to strain a firm as it is not yet generating revenue but has incurred expenditures.

A comparison of a number of measures of leverage and risk show that the firms are similar in many respects.

Management Commitment

All firms in the industry were faced with the same scrutiny, declining market conditions, and restrictions in capital markets. Using asset sales and other liquidity enhancements as a proxy, the commitment and seriousness of management can be measured. Table 13 shows what measures were taken by Calpine and AES prior-to and post- the downgrade of NRG in July 2002.

Table 13: Comparison of measures to improve liquidity

		Calpine	AES
Prior to July 2002	Reduction in Capital Spending (includes planned turbine purchases)	$3,200 (millions)	unspecified
	New Financing	$2,522	$0
	Monetization of assets[21]	negotiations	$260
	Asset Sales	$0	$780
Post July 2002	New Financing		$1,600
	Sale of Plants and Gas Properties	$471	$174
	Monetizing assets	$362.5	$0
Total 2002		**$6,555**	**$2,814**

AES responded quickly with asset sales. It announced the agreements to sell its CILCORP utility and New Energy marketing business generating $780MM cash (transactions closed post July). Calpine took on $2.5B in new debt, perhaps sensing the coming liquidity crisis and drastically cut its development program, of which, the renegotiation of turbine purchase commitments alone saved $1.2B for 2002 and $1.8B in 2003.

In February 2002, NRG reacted slowly to threats of a downgrade, more like a staunch utility rather than an independent upstart. It announced a plan consisting of four elements: 1) financial support from Xcel; 2) asset sales (by the end of 2002); 3) capital spending reductions, and 4) combining systems with Xcel. By July when NRG was downgraded, Xcel had contributed $500MM to NRG, they had not sold any assets, and all capital spending reductions had been scheduled for 2003 and 2004. In fact, NRG was

[21] Includes project financing, sale/leaseback transactions, income trusts (Canada), and other

still aggressively pursuing acquisitions including the $1.5B acquisition that caused the original credit concerns.

The behavior of management is obviously a determinant in whether a firm can restructure or not. In this case, NRG management either disregarded the threats of downgrade or lacked the ability to follow through with liquidity-enhancements.

Capital Structure

The three firms illustrate the range of capital structure available.

AES maintains a 'classic' project finance structure where debt is held at each project that is non-recourse to the parent firm. There are ongoing financial disadvantages as discussed previously however, a key advantage is that the parent firm can 'put' the project back to its lenders if it doesn't perform as AES did with its Drax UK facility and threatened to with AES Gener in Brazil. This provides the firm with some significant value during difficult times.

Calpine has virtually no project level, non-recourse debt. A key advantage to this structure is the level of flexibility it provides to the parent firm. Calpine was able to sell assets, as well as monetize facilities through income trusts, sale/leaseback transactions and other means.

Table 14: Comparison of Recourse Debt to Total Debt

	Calpine	AES	NRG
Recourse Debt to Total Debt	~100%	27%	38%

NRG originally looked like an investment firm with few consolidated assets. However by 2001, it had a structure that was a hybrid of Calpine and AES with a large amount of non-recourse debt at the subsidiary level. Some of the subsidiaries consisted of a 'pool' of assets (NRG Northeast for example) perhaps as a means of reducing transaction costs or providing risk reduction through diversification. A key inconsistency of the financing structure is the guarantee of the subsidiary debt, and in this case doing so through "contingent liabilities' – guarantees based on credit rating. Not only do cash flows get trapped at the projects, a disadvantage of the project-finance structure, but the parent firm is ultimately liable for the debt repayment. Also a certain amount of flexibility to sell assets is removed as lenders are secured against those assets and may be opposed to full or partial disposition of their security.

One cannot conclude that one financial structure is better than another, however, on balance, NRG may have had the least flexibility to make it through tough times.

IX. The Role of the Ratings Agencies

Perhaps the most interesting part of this study has been the role of the ratings agencies during this period and particularly with respect to the bankruptcy of NRG.

This study leads one has to fundamentally question the value of a credit rating. NRG had an investment grade rating but a downturn in the industry resulted in the bankruptcy of the firm in less than one year. Ironically, the cause of the bankruptcy was

a downgraded rating. Moody's Rating Action of Dec 2001[22] did not mention the contingent liabilities that would be triggered by a downgrade. This leads one to believe that it was either so commonplace it needn't be mentioned, or, perhaps the existence or magnitude of the liability was unknown or unappreciated. Incidentally, AES also had contingent liabilities relating to its trading arm NewEnergy, which was sold in July 2002, amounting to $260MM which is considerably less than NRG, especially given the relative size of the two firms.

Prior to the bankruptcy of Enron, firms in the industry continued to receive accolades from analysts and the ratings agencies. For example, Moody's had upgraded Calpine in Oct 2001 and in doing so commented on the other investment grade firms (such as NRG):

> *"Moody's upgrades CPN to investment grade as per the following. This morning, October 2 [2001], Moody's Investor Services upgraded the senior unsecured debt of Calpine Corporation ... to investment grade -- from Ba1 to Baa3. Moody's outlook is stable. * Moody's listed 6 primary reasons for the upgrade, including: 1) strong management 2) focused growth, vertical integration and operational commoditization strategies 3) demonstration of ability to implement those strategies 4) disciplined risk management 5) significant contracted power sales and gas hedges 6) Moody's projections demonstrating debt service coverage solely from contracted power sales of over 1x and debt service coverage comparable to other investment grade independent power issuers."*[23]

Moody's downgraded Calpine less than two months later in December, 2001 and then again in June 2002. By October 2002, Calpine's bonds were trading at yields greater than 30%.

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[22] Moody's Rating Action, December 4, 2001 (note: the first public mention found was after an NRG analyst call December 15, 2001).

[23] Deutsche Banc Alex Brown Research Report on Moody's downgrade (Oct 2, 2001)

The management of NRG and Xcel, on the other hand, did not seem to believe that it was possible to be downgraded. They did not commit to take action to improve their liquidity even after being put on credit watch. In fact, NRG continued to pursue the large acquisition that caused the December credit watch. Xcel, NRG's parent, was so sure it would not be downgraded that it bought the remaining shares of NRG to restructure it in-house which lead to its own downgrade. Even the bond markets did not anticipate the possibility of the downgrade; NRG Senior Unsecured bonds traded approximately at par until late June 2002 when Xcel's rating was lowered.

The bankruptcies of Enron and Worldcom brought in a new era of increased scrutiny where behavior that had been justified or ignored in the past was now unacceptable. Enron filed for Chapter 11 on Dec 2, 2001; days afterwards, all firms in the industry were downgraded or put on credit watch. Worldcom filed for Chapter 11 on July 22, 2002; NRG's credit rating was downgraded only four days later on July 26, 2002.

X. Conclusion

This paper looked at the financial distress within the power industry particularly in the year 2002. A commonly-used bankruptcy prediction model, the Z-score, was applied to firms in the industry to determine whether it could have predicted the ensuing bankruptcies. The Z-scores for all firms in the industry were very low and therefore did not discriminate between bankrupt and non-bankrupt firms. However, as a measure of default risk for the industry, the Z-score may be perfectly accurate. Although most firms had had low Z-scores historically, the level of risk and exposure to cyclicality had increased as business models changed to embrace the new deregulated merchant energy

era. Capital structures, leverage, and thus Z-scores should have changed to reduce that risk but did not. As such, a sudden industry downturn resulted in distress and bankruptcies.

Three firms were compared to understand the intricacies of the industry during 2002. AES and Calpine were distressed during 2002 and undertook restructuring; NRG filed for Chapter 11 bankruptcy. The firms had exhibited similar growth over the past several years, and showed similarities in financial ratios. There were differences however in their business models, capital structures, and reaction to the downturn in the market.

The bankruptcy of NRG Energy however, was due to its reliance on an investment grade credit rating which caused it to amass an undue amount of contingent liabilities. The management of NRG showed flagrant disregard for the warnings of the credit rating agencies, and did not attempt to restructure. Even the bond markets did not believe that NRG would be downgraded. When NRG was eventually downgraded, the contingent liabilities were triggered resulting in almost immediate insolvency and filing for Chapter 11.

There has been a significant amount of value destruction related to the growth of this industry. Enthusiasm by Wall Street, and relaxed ratings policies have resulted in significant over supply and difficult conditions that will persevere.

XI. Bibliography

AES Corporation, Annual and Quarterly Reports, 1998-2001.

Altman, E., Predicting the Financial Distress of Companies: Revisiting the Z-Score and Zeta Models, Working Paper, NYU Stern School of Business, July 2000.

Altman High Yield Bond Default and Return Report, Citigroup Corporate Bond Research, 1999-2004.

Calpine Corporation, Annual and Quarterly Reports, 1998-2001.

Dobson, James L., West, Jason, CPN: Upgraded to Investment Grade by Moody's. Reiterate Strong Buy, Deutsche Banc Alex. Brown Inc. Research Report, 10/2/2001.

Foreman, R.D., A Logistic Analysis of Bankruptcy Within the US Local Telecommunications Industry, Journal of Economics and Business 55, 135–166, 2003.

Foster, B. and T. Ward, Using cash flow trends to identify risks of bankruptcy, The CPA Journal 67(9):60-61, 1997.

Jacobyansky, A., Abbot, S.D., Moody's Places NRG Energy Under Review for Downgrade, Moody's Investor Service, Rating Action, Dec.4, 2001.

Jones, A., Energy Merchants take more Blows on Ratings as Shares Continue Plunge, McGraw Hill's Power Markets Week, July 1, 2002, New York

Kuffler, Laura A., Leung, Raymond M., Rating Criteria for Global Project and Infrastructure Developers, Journal Of Project Finance New York: Spring 1998. Vol. 4, Iss. 1, p. 55-66 (12 pp.)

Mossman, C.E., Bell, G.G., Swartz, L.M., Turtle, H., An Empirical Comparison of Bankruptcy Models, The Financial Review, Vol. 33, 1998.

MSN, Moneycentral.msn.com

NRG Energy, Annual and Quarterly Reports, 1998-2001.

NRG Energy, Third Amended Disclosure Plan for Debtors, July 2003.

Reuters Bond Service, www.ejv.com

Ricci, C.W., Bankruptcy Prediction: The Case of the CLECS, Mid American Journal of Business, Vol. 18 ,no.1 September 2003

Singleton, W.R., Evidence of the Effect of Alternative Consolidation Accounting Techniques on the Financial Decisions of Users, International Journal of Commerce & Management Indiana, Vol. 10, Iss. 3/4, p. 1-17 (17 pp.), 2000.

Smith, Rebecca, "Rating Agencies Crack Down on Utilities - Hard Line on Debt Jolts Power Industry", Wall Street Journal. (Eastern edition). New York, N.Y.: Dec 19, 2001.

Standard and Poor's, 2003, Merchant Energy Survival Hangs on FERC's Blueprint for Market Design Publication date: 03-Mar-2003 Credit Analyst: Peter Rigby, New York

The Wall Street Transcript Inc., CEO Interview with Peter Cartright, Excerpt from Enercom Oil and Gas Special July 2001.

Thomson Media, Datastream database

Transcipt: February 8, 2005, Statement of Micah S. Green, President, The Bond Market Association, Testimony Before The Committee on Banking, Housing and Urban Affairs, United States Senate, Hearing on the Role of Credit Rating Agencies in the Capital Markets

UBS Warburg, NRG: Announces Acquisition of 2,535 MW of Ohio-Based Generation, UBS Warburg Research Note, Nov 30, 2001.

Young, Eric, "Court approves PG&E bankruptcy plan", The Daily Deal, Apr 12, 2002.

Other research reports from UBS Warburg, Morgan Stanley, Salomon Smith Barney, Williams Capital Group, and Credit Suisse.

Appendix A: Altman's Z-Score

The final form of the original Z-score is:

$$Z = 1.2 \cdot X_1 + 1.4 \cdot X_2 + 3.3 \cdot X_3 + 0.6 \cdot X_4 + 1.0 \cdot X_5$$

Where: X_1 = working capital/total assets,

X_2 = retained earnings/total assets,

X_3 = earnings before interest and taxes/total assets,

X_4 = market value equity/book value of total liabilities,

X_5 = sales/total assets, and

Z = overall index where a score of less than 1.81 will predict bankruptcy and a score above 2.675 will predict not-bankruptcy.

A later version of the Z-score called the "Z-double-prime" (Z'') was developed which has the form:

$$Z'' = 6.56 \cdot X_1 + 3.26 \cdot X_2 + 6.72 \cdot X_3 + 1.05 \cdot X_4$$

Where: X_1 = working capital/total assets,

X_2 = retained earnings/total assets,

X_3 = earnings before interest and taxes/total assets,

X_4 = book value of equity/book value of total liabilities,

Z" = overall index where a score of less than 1.1 will predict bankruptcy and a score above 2.6 will predict not-bankruptcy.

Functionally the Z'' is the same as the original z-score although the X_5 term has been eliminated which allows a better comparison of firms/industries where asset turnover is unique or irrelevant.

Appendix B: Firms Studied

	Defaults	Date of Default	Total Liabilities
1	York Research Corp	2001	223
2	Covanta Energy Corp (formerly Ogden)	2002	3,180
3	NRG	2002	10,657
4	PG&E NEGT	2003	8,927
5	Northwestern Corp (Montana Power	2002/2003	3,129
6	Mirant	2003	16,460
	Total		42,576
	Distressed	**Date of Distress**	**Total Liabilities**
1	Calpine	2002	18,299
2	Dynegy	2002	19,349
3	Williams	2002	32,862
4	Reliant	2002	6,308
5	Aquila	2002	9,397
6	El Paso	2002	38,815
7	Allegheny Energy	2002	8,384
8	AES	2002	31,197
9	CenterPoint Energy Inc.	2002	23,822
10	MidAmerican Energy Holidings	2002	10,907
11	Edison Mission Energy	2002	9,153
	Total		208,493

Appendix C: Further Detail of AES Restructuring

AES Refinancing

The refinancing consisted of three steps.

1) Refinance current and near-term debt with "super" seniority notes and secured credit facility with short term debt giving generous terms for noteholders and new credit providers. (Compare 2001 to 2002 debt profiles)

2) Refinance mid-term debt to create a flatter debt profile. AES accomplished this with the May, 2003 private placement and continuing asset sales. (Compare 2002 to 2003 debt profiles)

3) Repay high interest rate debt and lower carrying costs. AES continued to cut debt through 2004 with asset sales and an equity offering. (Compare 2003 to 2004 debt profiles.)

All of the steps of the refinancing involved a commitment by management to improve liquidity by selling assets. Selling assets will always involve a tradeoff between liquidity and cash flows. Selling assets will inevitably reduce cash flows and may limit the firm's ongoing viability. An examination of Figure 9 shows consolidated revenues and gross margin by region and year for AES, indicates that cash flows are at or above pre-distress levels even after asset sales. Gross margin and revenues from South America however, have increased substantially, indicating a larger exposure to these economies.

AES' debt maturities have been pushed substantially into the future. Approximately $500 and $600MM come due in 2007 and 2008 respectively. They have

decreased their cost of debt and have substantial liquidity. Their current revolver is virtually undrawn with a 650MM limit doesn't come due for renewal until 2007.

Figure 9: AES Revenues and Gross Margin by Region

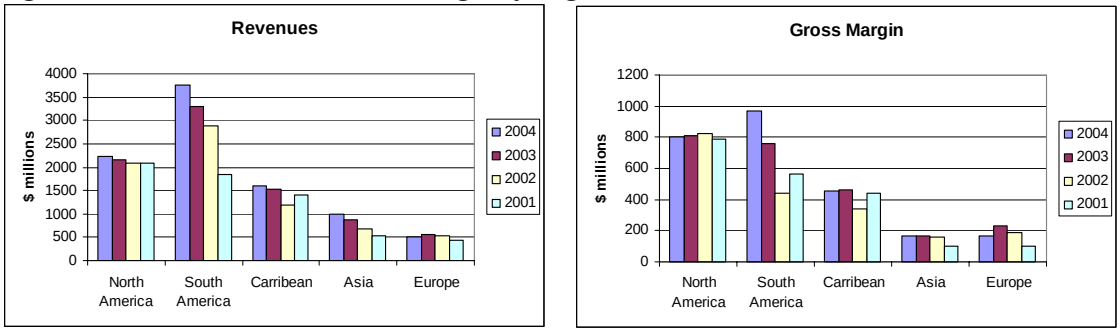


Table 15: Details of December 2002 Refinancing (AES)

Retired debt		New debt		Details
300MM, 8.75% 200 MM , 7.375%	Dec 15, 2002 Jun 2003	305MM 10% Sr. Secured	2005	- 65% of FV in cash immed. (300) - 35% new 10% notes (300) - exchange at FV (200)
850MM, L+200 425MM, L+250 262MM, L+238 52.2GBP, L+250	Mar 2003 Aug 2003 Jul 2003 2004	1,600MM Sr. Secured Credit Facility LIBOR+650	Nov-04 Jul-05	-50% due Nov'04 and 50% due Nov'05 -1st lien on 100% of AES equity in subs
New notes and credit facilities are secured against 100% of equity in AES domestic subs and 65% of equity in certain overseas businesses Cash from all new debt issuances, equity issuances, assets sales and parent level EBITDA must in part go to pay down new debt Required to repay $810mm of credit facility by Nov 25, 2004 Increase in interest expense of $65MM per year.				

Table 16: Details of May 2003 Private Placement

Retired debt		New debt		Details
475MM Sr.Sec.Credit 49MM Sr. Notes (8%) 180MM Sr. Notes (8.75%)	2005 2008 2008	1,200MM (8.75%) 600MM (9%)	2013 2015	2nd priority to Senior Notes and credit facility issued Dec 2002

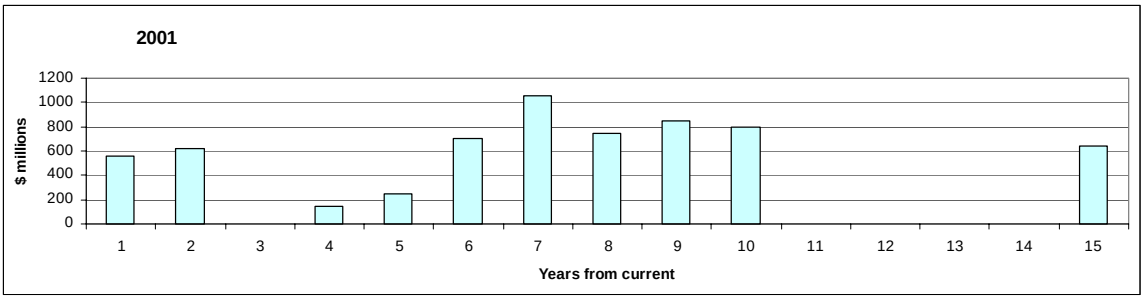
Retired debt		New debt	Details
283MM Sr. Notes (9.5%)	2009		
463MM Sr. Notes (9.375%)	2010		
250MM Sr. Notes (8.875%)	2011		
Total = $1.7 billion		Total = $1.8 billion	

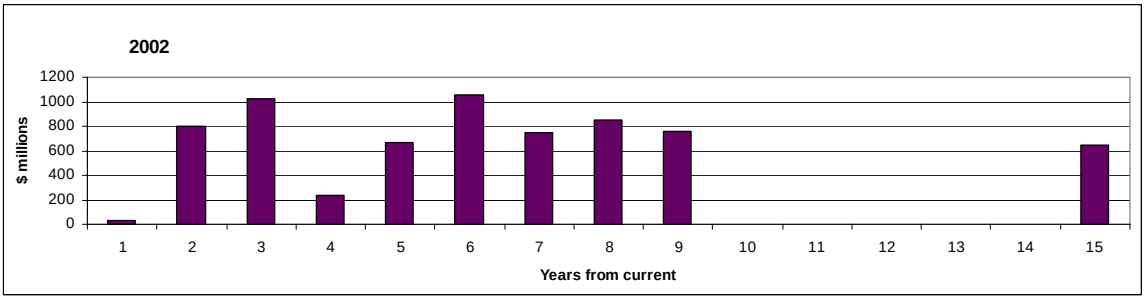
Table 17: Summary of AES Debt Structure before and after distress

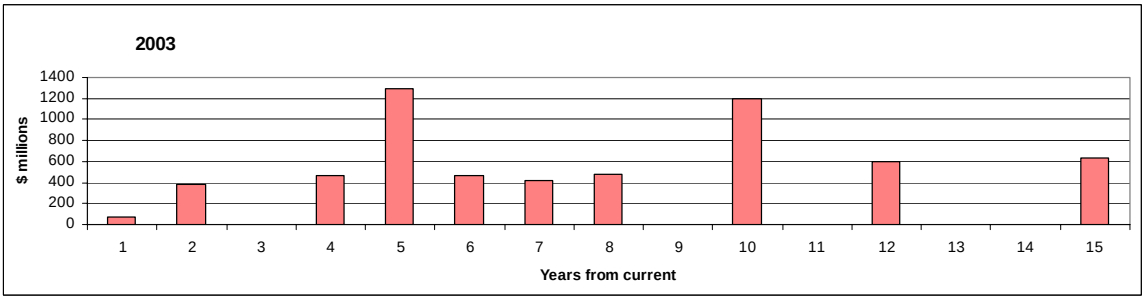
				After Refi	After Pvt Pl
	Int Rate	Mat.	2001	2002	2003
Corporate Revolving Bank Loan	Var	2002	70		
Corporate Revolving Bank Loan	8.10%	2005		228	
Corporate Revolving Bank Loan	8.10%	2007			
Senior Secured Term Loan	5.13%	2008			300
Senior Secured Term Loan	5.32%	2008			400
Term Loan		2003	425		
Term Loan		2002	188		
Term Loan (50% due 2004)	8.12%	2005		500	
Term Loan (50% due 2004)	7.99%	2005		427	
Term Loan (50% due 2004)	7.94%	2005		260	
Total First Priority			**683**	**1,415**	**700**
First Priority as % of Total			**11%**	**21%**	**12%**
Senior Notes	8.75%	2002	300		
Senior Notes	8%	2008	200	199	150
Senior Notes	8.75%	2008	400	400	223
Senior Notes	9.50%	2009	750	750	470
Senior Notes	9.38%	2010	850	850	423
Senior Notes	8.88%	2011	600	537	313
Senior Notes	8.80%	2011	196	217	170
Senior Notes	10%	2005		258	232
Senior Notes (2nd priority)	8.75%	2013			1200
Senior Notes (2nd priority)	9.00%	2015			600

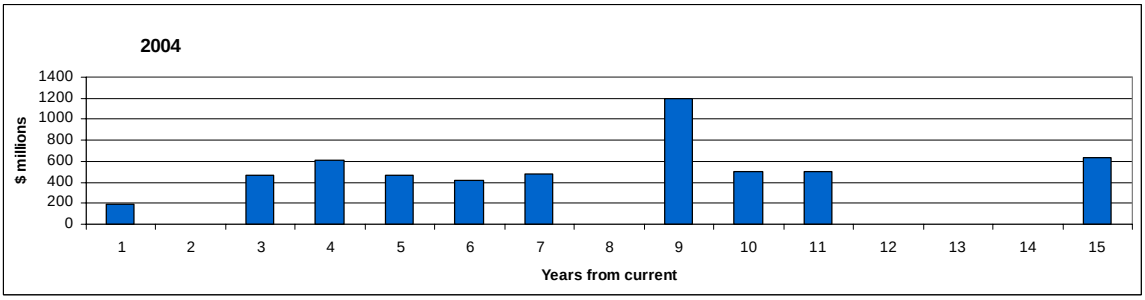
	Int Rate	Mat.	2001	After Refi 2002	After Pvt Pl 2003
Remarketable or Redeemable Sec.	7.38%	2003	200	26	
Total Senior Notes			**3,496**	**3,237**	**3,781**
Senior Notes as % of Total			**55%**	**48%**	**64%**
Sr. Sub. Notes	10.25%	2006	250	231	
Sr. Sub. Notes	8.38%	2007	325	316	210
Sr. Sub. Notes	8.50%	2007	375	349	259
Sr. Sub. Notes	8.88%	2027	125	125	115
Conv. Jr. Sub. Debentures	4.50%	2005	150	150	150
Conv. Jr. Sub. Debentures	6%	2008	460	460	213
Conv. Jr. Sub. Debentures	6.75%	2029	518	518	517
Total Sub. Or Jr. Sub			**2,203**	**2,149**	**1,464**
Subordinated as % of total			**35%**	**32%**	**25%**
Total Recourse Debt			**6,382**	**6,801**	**5,945**

AES Debt Maturity Schedule Before, During and After Refinancing









Appendix D: Further Details of Calpine Restructuring

Table 18: Summary of July 11, 2003 $3.3B refinancing:

Old Debt		New Debt	
May 2004 Term Loan	$950	4 year term loan	$750
2005 Corporate Revolver	$450	2007 2nd Priority Secured	$500
2004 Puttable Convertible	$400	2010 2nd Priority Secured	$1,150
Effective debt retirement @$0.90	$1,450	2013 2nd Priority Secured	$900
Fees	$50		
Total	**$3,300**	**Total**	**$3,300**
Increase in pre tax interest cost: $43MM			

Appendix E: NRG Balance Sheet After Restructuring

Balance Sheet			Common Size	
	2001	2003	2001	2003
Current Assets	1,187	2,113	9%	23%
Net PP&E	9,432	4,416	73%	48%
Investments in Projects	1,051	745	8%	8%
Other Non-Current Assets	1,224	1,986	9%	21%
Total Assets	12,895	9,260	100%	100%
Current Liabilities	1,951	2,026	15%	22%
Minority Interest	68	37	1%	0%
Non-Recourse Debt	4,871	0	38%	40%
Recourse Debt	2,972	3,661	23%	
Other Non-Current Liabilities	795	1,099	6%	12%
Total Liabilities	10,657	6,823	83%	74%
Retained Earnings	635	11	5%	0%
Total Equity	2,237	2,437	17%	26%
Total Liabilities and Equity	12,895	9,260	100%	100%