CERCLA 108(b) Economic Sector Profile: Electric Power Generation, Transmission, and Distribution Industry

(Background Document Supporting CERCLA 108(b) Proposed Rule for NAICS 2211)

June, 2019

INTRODUCTION

This document summarizes public data collection, research, and analyses conducted with respect to companies in NAICS 2211, Electric Power Generation, Transmission, and Distribution, one of the three additional classes of facilities potentially subject to regulation under CERCLA 108(b). Specifically, this document assesses current industry trends regarding market consolidation through mergers and acquisitions (M&A), bankruptcies, and site closures, as well as the industry's overall financial stability and health. The document also discusses individual subsectors of this NAICS that are of particular interest to this rulemaking. These subsectors include: fossil fuel (NAICS 221112), nuclear generation (NAICS 221113), hydroelectric generation (221111), and electric power transmission, control, and distribution (NAICS 22112).

The analysis begins with a high-level industry profile and a summary of financial metrics, market consolidation and diversification trends, industry default risk, and accounting standards for environmental liabilities for entities in NAICS 2211. This broad approach is necessary because companies in the Electric Power Generation, Transmission, and Distribution industry tend to be diversified and may participate in multiple subsectors of interest. In addition, detailed financial data were not consistently available at a subsector level, driving the need to focus on a higher-level NAICS. The analysis then proceeds to review individual subsectors, focusing on subsector trends, the universe of potentially regulated entities, and available financial data.

Generally, this analysis finds that the Electric Power Generation, Transmission, and Distribution industry remains financially stable. The industry is characterized by diversified fuel sources and vertical integration, reducing firms' dependency on any one subsector and strengthening long-term financial stability. According to the 2018 U.S. Cost of Capital Valuation Handbook, the industry experienced less risk and volatility than the overall market in the U.S. For more detail, see the Industry Default Risk and Examples section.

While default risk remains relatively low industry-wide, two risk factors threaten financial stability for some firms: high dependency on coal and nuclear generation, and rapid market consolidation through M&A. Generally, coal and nuclear electric generation pose the greatest default risk. Many coal plants have closed or converted to other fuel types in recent years and new investment in the subsector is dormant. Nuclear plants are subject to a strict regulatory environment, limiting competitive pricing opportunities. Thus, firms that rely heavily on coal or nuclear electric generation tend to be less financially stable than firms with diversified generation sources or fully integrated firms. Some notable bankruptcies in recent years stemmed from a high dependency on coal and nuclear power generation (see Industry Default Risk and Examples section for more details).

M&A in recent years may have enhanced financial stability in the long-run, further diversifying large firms across subsectors. At the same time, rapid market consolidation through M&A has led to potential liquidity issues among some firms and subsequent default risk according to standard financial ratios (see NAICS 2211 Financial Summary and Consolidation and Subsector Diversification sections for more details). As a result, ratios reflect the high capital costs associated with M&A that should resolve as new acquisitions gain profitability. The following sections provide more detail regarding the industry's financial stability and risk as well as limitations associated with relying on industry-wide ratio analysis.

Note that this report has been prepared primarily for purposes of gathering information on the financial make-up and health of the subject industry and subsectors, without any intent to interpret or draw conclusions from the data or with respect to individual companies operating in the industry.

NAICS 2211: ELECTRIC POWER GENERATION, TRANSMISSION, AND DISTRIBUTION

Sector Profile

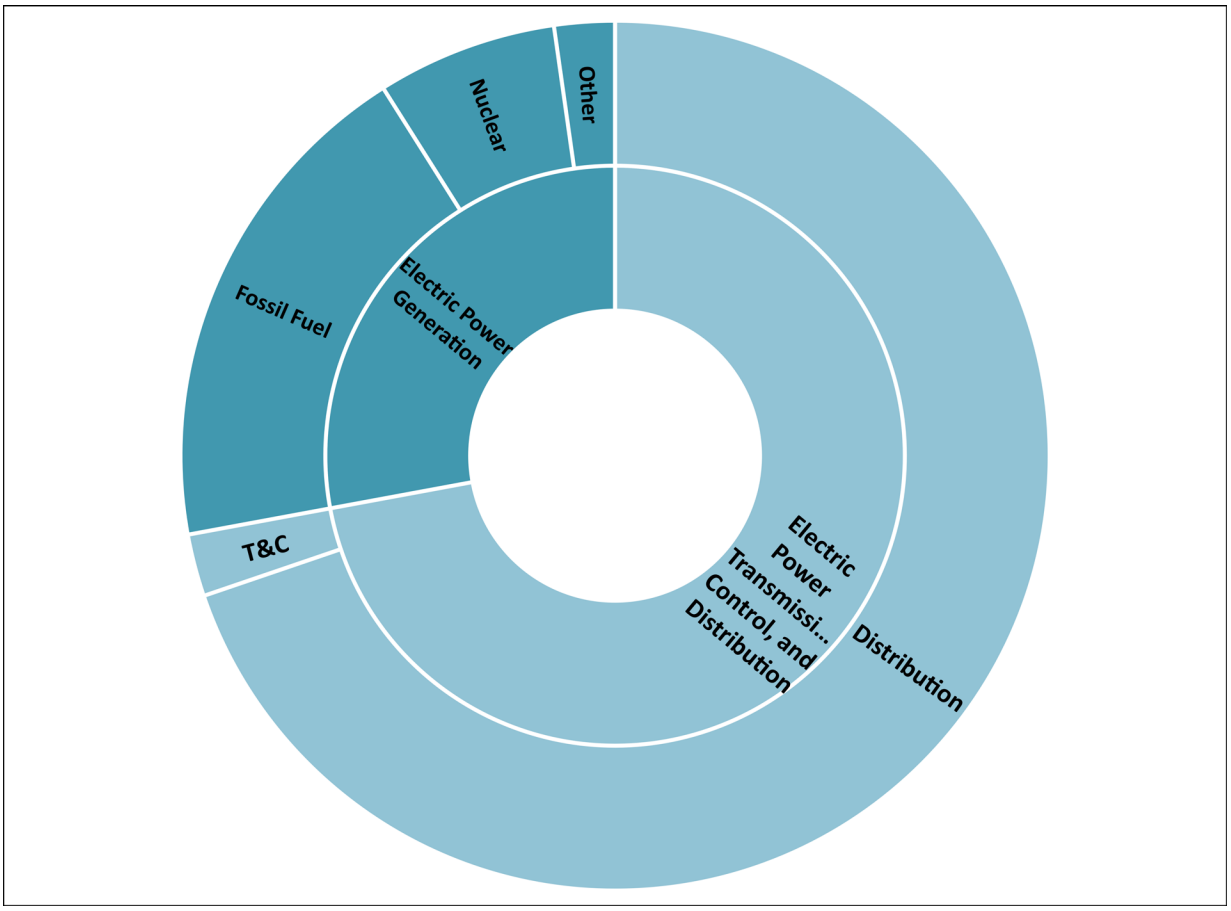
NAICS 2211, a sector of the utilities industry, encompasses electric power generation, transmission, and distribution, including fossil fuel nuclear generation, hydroelectric generation, and electric power transmission, control, and distribution. Also included in this industry are natural gas, wind, solar, and renewable power generation operations.

According to the U.S. Census Survey of Business Owners, firms under NAICS 2211 generated $430 billion in total value of sales, shipments, receipts, revenue or business done in 2012. For context, total value of sales shipments, receipts, revenue, or business done in 2012 for the Utilities industry and Mining, quarrying, and oil and gas extraction industry were $532 and $529 billion respectively.

As Figure 1 below shows, of NAICS 2211's $430 billion, 72 percent came from Electric Power Transmission, Control, and Distribution, while Electric Power Generation accounted for the remaining 28 percent. Within Electric Power Transmission, Control and Distribution, distribution accounted for 97 percent of the value of sales, shipments, receipts, revenue and business done, while transmission and control (T&C) only accounted for 3 percent. Within Electric Power Generation, fossil fuel power generation made up the largest portion of the value of sales, shipments, receipts, revenue, and business done, accounting for 68 percent.[1]

[1] U.S. Census Bureau: American FactFinder. 2016 County Business Patterns. Accessed at https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=BP_2016_00A1&prodType=table.

Figure 1. NAICS 2211 Value of Sales, Shipments, Receipts, Revenue, or Business Done, by Industry and Subsector, 2012



Source: US Census Bureau 2016.

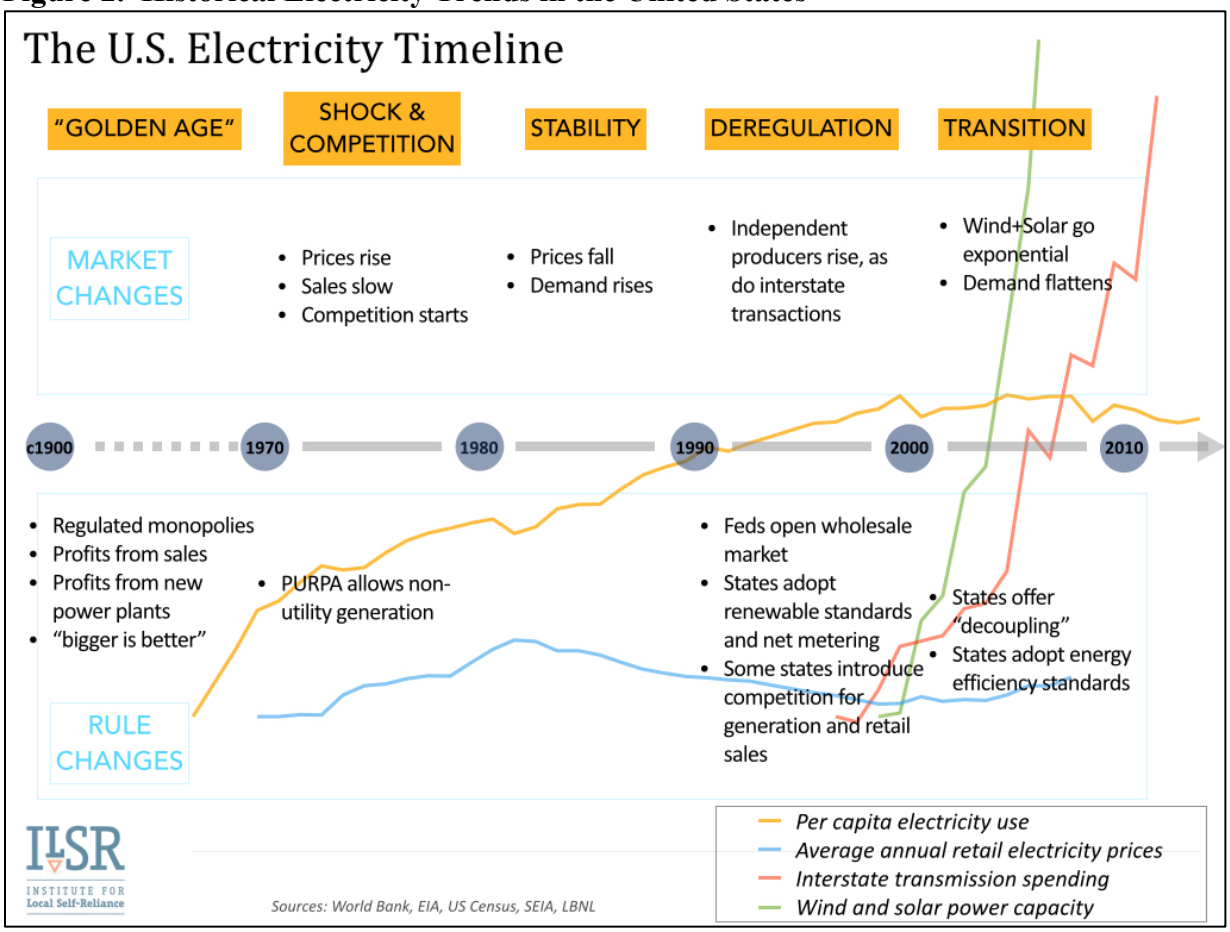
Similarly, according to U.S. Census estimates, Electric Power Transmission, Control, and Distribution accounted for 72 percent of the 10,802 establishments in the industry in 2016, with a large majority involved in electric power distribution. Of the remaining 28 percent of establishments in 2016, almost half were fossil fuel power generators. [2]

Annual payroll for NAICS 2211 increased from $49.5 billion in 2012 to $54.7 billion in 2016. In that same period, the number of paid employees in the industry dropped from 509,704 to 507,431.[3] Of the 507,431 employees in 2016, almost three-quarters were employed in Electric Power Transmission, Control, and Distribution, and the remaining quarter was employed in Electric Power Generation. Within Electric Power Transmission, Control and Distribution, 96 percent of employees worked in distribution while only 4 percent worked in transmission and control. Overall, Electric Power Distribution accounted for 71 percent of employed individuals in NAICS 2211 in 2016. Within Electric Power Generation, 55 percent of employees worked in fossil fuel electric power generation.

[2] Ibid.
[3] Ibid.

Figure 2 provides historical context for the electricity industry. Key trends in recent years include growth in renewable fuel sources such as wind and solar and stagnant energy demand and electricity prices. These recent trends squeeze profit margins and intensify price competition.

Figure 2. Historical Electricity Trends in the United States

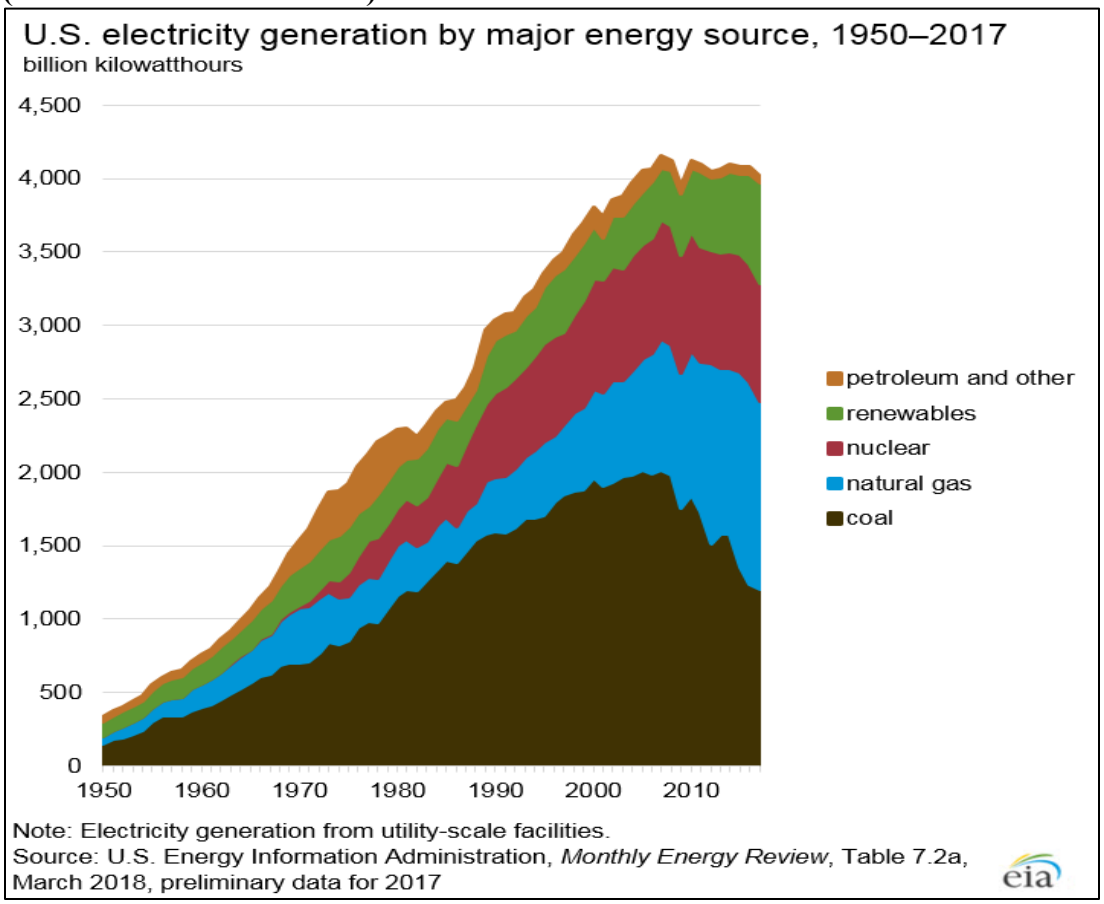


Source: Farrell 2014[4]

Figure 3 provides further historical context, showing trends in electric generation by energy source from 1950 to 2017. Coal generation peaked in the early 2000s and dropped steadily as the portion of energy generation from renewables and natural gas grew. Consistent with the trends shown in Figure 2, the transition from coal to natural gas, a much cheaper fuel source, resulted from enhanced price competition in recent years. In the early 2000's, coal made up about one half of total energy generation; by the late 2010s, the proportion of energy generation from coal had dropped to approximately a quarter. The portion of electric generation from nuclear power grew rapidly at the end of the 1990s and remained relatively steady from the turn of the century to 2017. Renewables, including hydropower, have grown in recent years.

[4] Farrell, John. 2014. A $48 Billion Opportunity for U.S. Electric Customers. Institute for Local Self-Reliance. Accessed at https://ilsr.org/u-s-utility-customers-save-48-billion-solar-efficiency/.

Figure 3. U.S. Electricity Generation by Major Energy Source (Billions of Kilowatt-hours)



Source: EIA[5]

Market Structure and Risk

This section summarizes the market structures under which NAICS 2211 firms operate and evaluates the potential risk level associated with each structure. Firms, their owners/shareholders, and the taxpayer may experience different risk profiles based on the companies' ownership (private or publicly held) and the nature of the market in which they operate (regulated or deregulated).

Public Versus Private

Figure 4 shows the types of entities that own utilities engaged in generation, transmission, and distribution, organized by percent of total volume generated/transmitted/distributed. As the figure shows, 78 percent of electricity in the U.S. is generated by privately owned entities, including investor-owned utilities (IOUs) and independent generators. IOUs also perform 80 percent of transmission and half of distribution activities. Publicly owned utilities (POUs) are involved in generation, transmission, and distribution, contributing 15, 12, and 50 percent to each

[5] EIA (Energy Information Administration). 2018a. Electricity in the United States is produced with diverse energy sources and technologies. Accessed at https://www.eia.gov/energyexplained/index.php?page=electricity_in_the_united_states.

category, respectively. The Federal Government accounts for seven percent of net generation and eight percent of transmission through its nine power agencies.[6] Among the government-owned power agencies is Tennessee Valley Authority (TVA), the largest regional planning agency of the federal government, serving portions of Tennessee, Alabama, Mississippi, Kentucky, Georgia, North Carolina, and Virginia. The Federal Government also operates Power Marketing Administrations (PMAs) such as Bonneville Power Administration, Western Area Power Administration, Southwestern Power Administration, and Southeastern Power Administration.

Figure 4. Utilities Ownership as a Portion of Generation, Transmission, and Distribution

Ownership	Portion of Total Generation	Portion of Total Transmission	Portion of Total Distribution
Investor-Owned Utilities (IOUs)	38%	80%	50%
Independent	40%	0%	0%
Publicly Owned Utilities (POUs) and cooperatives	15%	12%	50%
Federal Government	7%	8%	0%
Total	**100%**	**100%**	**100%**

Source: US Department of Energy.[7]

Federal government-owned utilities experience extremely low default risk and therefore are able to access lower cost capital. POUs may also present a somewhat lower risk of bankruptcy relative to the market overall due to the more detailed financial reporting requirements and government oversight. They may also have access to lower-cost forms of financing such as tax-free bonds and local low-interest loans.

Regulated versus Deregulated Electricity Markets

Utilities operate in either regulated or deregulated markets. This section examines how market structure affects risk and stability in NAICS 2211.

The Public Utilities Regulatory Policies Act in 1978 and subsequent Energy Policy Act in 1992 opened electricity markets, granting states the option to deregulate the supply of electric power. Many states opted to deregulate, seeking to enhance consumer choice and encourage clean energy. Other states remain regulated, enjoying stable prices and long-term certainty.[8]

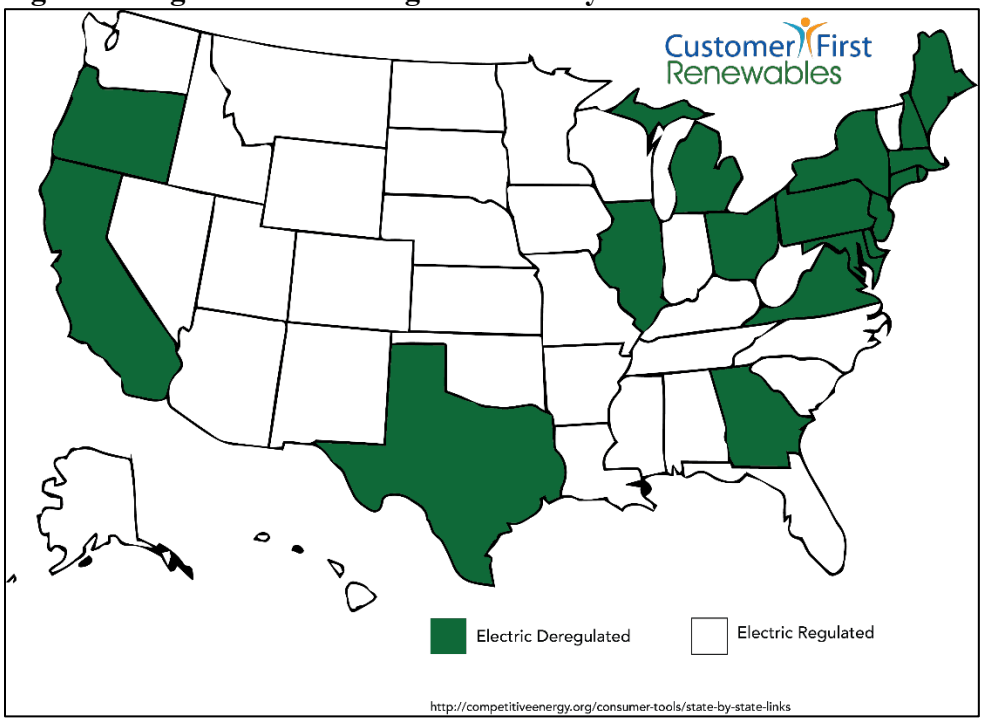
[6] Ibid.

[7] US Energy Department. Electricity 101. Energy.gov. Accessed at https://www.energy.gov/oe/information-center/educational-resources/electricity-101.

[8] EnergyWatch. 2018. Regulated vs. Deregulated Electricity Markets. Accessed at https://energywatch-inc.com/regulated-vs-deregulated-electricity-markets/.

As shown in Figure 5, most deregulated markets are clustered in the northeast but joined by a few sizeable markets in the south and west such as Texas and California.

Figure 5. Regulated and Deregulated Utility Markets



Source: Customer First Renewables.[9]
Note: Some deregulated markets remain partially regulated due to the structure of the grid, historic reasons, and geographic boundaries of utilities' territories.

Regulated markets are characterized by vertically integrated monopolies that own and operate all infrastructure and value chain components, from generation to consumer sales. Regulated firms are given reasonable opportunity to recover prudently incurred costs in their rates. As such, firms in regulated markets must demonstrate that their decision making is prudent (cost- and risk-minimizing) given the alternatives and market condition. Once an expenditure is deemed prudent, the utility can recover all associated costs through rate regulation. In regulated markets the Public Utilities Commission sets rates, stabilizing prices and enhancing profit predictability. At the same time, the monopolistic structure of a regulated market restricts customer choice.

Deregulated or merchant markets allow for competition as generation plants sell wholesale electricity to retail suppliers, who then set prices. Market-driven prices allow companies to enjoy higher margins when demand is high. However, unlike regulated markets, companies in deregulated markets risk their own capital when making new investments without guaranteed cost recovery for prudent investments. Benefits of deregulated markets include enhanced

[9] Customer First Renewables. N.d. Regulated and Deregulated Energy Markets. Accessed at https://www.customerfirstrenewables.com/resources/regulated-deregulated-energy-markets/.

consumer choice and increased availability of clean energy while drawbacks include price volatility and uncertainty.

Generally, entities operating in regulated markets may pose lower financial/default risk, as set rates and monopolistic structure guarantee predictable and stable revenues. Firms in deregulated markets capitalize on favorable market conditions such as increased demand but suffer losses in unfavorable conditions due to high exposure to price volatility. Therefore, bankruptcy is relatively more likely among firms in deregulated markets.

Financial Summary

This section summarizes financial health and trends in financial condition observed among firms operating under NAICS 2211 using readily available sources. The purpose of this section is to provide an overview of the industry's general financial status; it does not intend to draw conclusions or predict the future health of the industry or any individual firms within the industry. A single, comprehensive source for NAICS 2211 financial information is not available; two data sources are used in tandem to generate the financial summary presented in this section. Specifically, this section relies on data from the Risk Management Association (RMA) and Bizminer, a market research firm. RMA reports capture small- and medium-sized firms in the industry, while Bizminer reports include the largest firms in the industry. Thus, the Bizminer reports in tandem with RMA studies provide more comprehensive estimates of the utilities industry's financial health than either report alone.

RMA produces pro forma financial statements by NAICS code and company asset class, for companies with up to $250 million in assets. The reports provide financial ratios and a breakdown of the various components of assets and liabilities in percentage terms (relative to the total).

RMA reports provide detail regarding the variance in financial performance and health in the industry by firm size in terms of assets focusing on small and median sized firms. RMA estimates that net sales and total assets for all firms under NAICS 2211 in fiscal year 2017 both totaled $9.9 billion. Within RMA's sample, sales are concentrated among large firms. Relatively large firms (firms with $100-$250 million in assets) generated 62 percent of the total net sales, while medium-sized firms (firms with $50-$100 million in assets) generated 14 percent and smaller firms (firms with $10-$50 million in assets) generated19 percent. The remaining four percent of sales came from the smallest asset group ($2-$10 million in assets).[10] For context, in the Utilities sector overall (NAICS 22), the top asset group accounts for 65 percent of total net sales.

As noted above, RMA financial reports cover firms with up to $250 million in total assets. At the same time, a portion of the firms in the utilities industry maintain large operations. For example, in 2017, Duke Energy Corporation, Exelon Corporation, The Southern Company, and Nextera Energy Inc. generated revenues of $23, $33, $23, and $17 billion, respectively, on asset bases of $143, $119, $111, and $98 billion respectively.[11] These large firms dominate a substantial portion of the Electric Power Generation, Transmission, and Distribution market but are not captured in RMA reports, which only analyzed 177 firms in 2017. As a result, Bizminer reports

[10] RMA University (Risk Management Association). N.d. eStatementStudies: Industry Data. Accessed at https://rmau.org/.

[11] D&B Hoovers. N.d. Accessed at http://www.hoovers.com.

were used to supplement RMA data to consider a broader range of firms in the industry, including the industry's largest firms.

Bizminer's financial report for NAICS 2211 summarizes data for 2013-2017, with the number of firms analyzed ranging from 4,210 in 2013 to 2,635 in 2017.[12] The reports allow the user to review the financial performance of firms in the subject industry. Specifically, the reports summarize average company-level financial and market information based on a sample of firms in a particular NAICS code, including profit and loss statements, ratios, balance sheet data, etc. Market concentration among large, vertically integrated companies skew Bizminer's report. Consolidation of big firms in recent years skews the data further (see below). As a result, Bizminer's average firm has more sales revenues and assets than the median firm in the industry. Bizminer's average firm is also not representative of the major industry players, such as the companies listed above, whose asset holdings and revenues are in billions of dollars. Consequently, the Bizminer reports should not be interpreted as the average firm's performance but rather a summary of the direction in which the overall industry is moving. Though the sales revenues and other financial data do not reflect an average firm in the industry, Bizminer reports help capture the effects of large companies on the industry's overall financial structure.

Bizminer and RMA financial summary reports provide financial ratios for companies under NAICS 2211. Financial ratios help examine trends over time and provide a deeper assessment of the industry's and companies' financial health.

RMA reports the following financial statistics for its sample:

- Cash flow-solvency
    - A current ratio (current assets/current liabilities) of 1.20 in fiscal year 2017, suggesting that firms are able to cover their short-term debt using their current (liquid) assets.
    - A quick ratio, which shows the extent to which the company's highly liquid assets (cash and accounts receivable) cover its current liabilities, of 0.9 in fiscal year 2017 and 0.8 for firms in its highest reported asset class.
- Profitability
    - Total assets from fiscal year 2013 to fiscal year 2017 for firms with assets below $250 million varied from a low of $8.3 billion in 2016 to a high of $9.9 billion in 2017.
    - The median sales to total assets ratio of 0.8 for all firms and 0.5 for the largest firms in fiscal year 2017. Generally, higher sales to total asset ratios are favorable, indicating higher profitability relative to assets.
- Efficiency
    - A working capital turnover in fiscal year 2017 of 22.6, but the same ratio for firms in the largest asset class was 208.6. Generally speaking, a high working capital turnover indicates effective use of working capital to generate sales and

[12] These values are roughly consistent with the U.S. Census counts, presented above.

little need for additional funding. However, an extremely high ratio may indicate that a firm does not have enough capital to support its sales growth.

- Debt Risk
    - An interest coverage ratio of 2.9 in fiscal year 2017, down from 5.2 in 2016, indicating sufficient (though declining) ability to cover interest expenses.
    - A total liabilities to tangible net worth ratio of 2.0 for all firms in fiscal year 2017, and 2.5 for the largest firms, indicating that firms are highly leveraged (hold more debt than equity).

Bizminer reports the following for its sample:

- Cash flow-solvency
    - A current ratio of 1.02 in 2017, suggesting the average firm is able to cover its short-term debt.
    - The quick ratio declined from 1.01 to 0.64 between 2016 and 2017, indicating weakening cash flows relative to liabilities.
- Profitability
    - Both the percentage costs of sales and percentage cost of labor dropped, resulting in a relatively high gross margin; between 2013 and 2016, gross margin made up about a quarter of revenue and in 2017 it made up almost 40 percent.
    - Return on assets (ROA) and return on equity (ROE) are two of the measures of a firm's profitability. They are calculated as net income divided by total assets (ROA) and shareholders' equity (net worth) (ROE) respectively and expressed as a percentage. According to Bizminer, after-tax ROA for an average utilities firm fell from 4.08 percent to 1.89 percent between 2013 and 2017 while after-tax ROE fell from 11.52 to 6.21 over the same period. Despite the downward trend, positive ROA and ROE values generally indicate financial strength and an ability to generate profits from assets and equity contributions. Though net income rose in 2017, the ROA and ROE fell because total assets and total shareholders' equity rose by relatively more.
- Efficiency
    - Sales per employee increased and gross margin to business revenues ratio increased due to lower cost of sales relative to business revenue in 2017, suggesting efficiency among firms.
    - Days inventory ratio increased from about 15 in 2016 to 36 for the average firm in 2017, indicating possible shortages and inability to deliver in a timely manner.
    - Between 2013 and 2016, working capital turnover (sales/working capital) ranged from 7.19 to 9.52. In 2017, working capital turnover jumped to 106.22 due to the sharp increase in sales revenue the industry experienced that year.

- Debt Risk
    - An interest coverage ratio of 4.5 in 2017, indicating sufficient profitability to cover interest expenses.
    - A decrease in the ratio of current liabilities to net worth, indicating sufficient capability to cover short-term debt.
    - The long-term liabilities to net worth ratio increased due to a large increase in long-term liabilities relative to the increase in net worth, indicating a higher risk in firms' ability to satisfy long-term debt.
    - The modified Altman Z-score for an average firm in the utilities industry of 1.70 in 2013 fell to 0.73 in 2017, indicating an overall increase in default risk. The Z-score is a credit-strength estimate that evaluates the firm's risk of default and likelihood of bankruptcy. A higher Z-score is generally better and indicates low likelihood of default. This relatively low score may reflect the unusual trends in market consolidation and may resolve in more normal conditions and as newly acquired capacity becomes profitable.

The overall financial position of the average firm in the utilities industry is relatively healthy, but the increase in sales and fixed asset investment in 2017 pose some financial risks, particularly for large firms. Firms were generally profitable; according to Bizminer, business revenues for the average firm increased three-fold in 2017 while costs of sales increased relatively less. RMA also reports a 26 percent increase in industry net sales from 2016 to 2017. Generally, the industry was able to maintain efficiency. Consolidation likely drove the dramatic increase in business revenue and fixed assets relative to net worth and profit, resulting in long-term debt risk.

Business revenue fluctuation for the average firm led to weaker cash flow solvency and liquidity. Generally, the firms under NAICS 2211 can cover short-term debt and interest expenses but face a default risk with respect to the long-term debt. However, long-term risk may resolve as new acquisitions become profitable in the long term. Additionally, these cash flow-solvency issues likely stem from rapid growth and consolidation in 2017 and should resolve under more normal conditions of growth and consolidation. The effects of consolidation and subsector diversification are discussed below in more detail.

Consolidation and Subsector Diversification

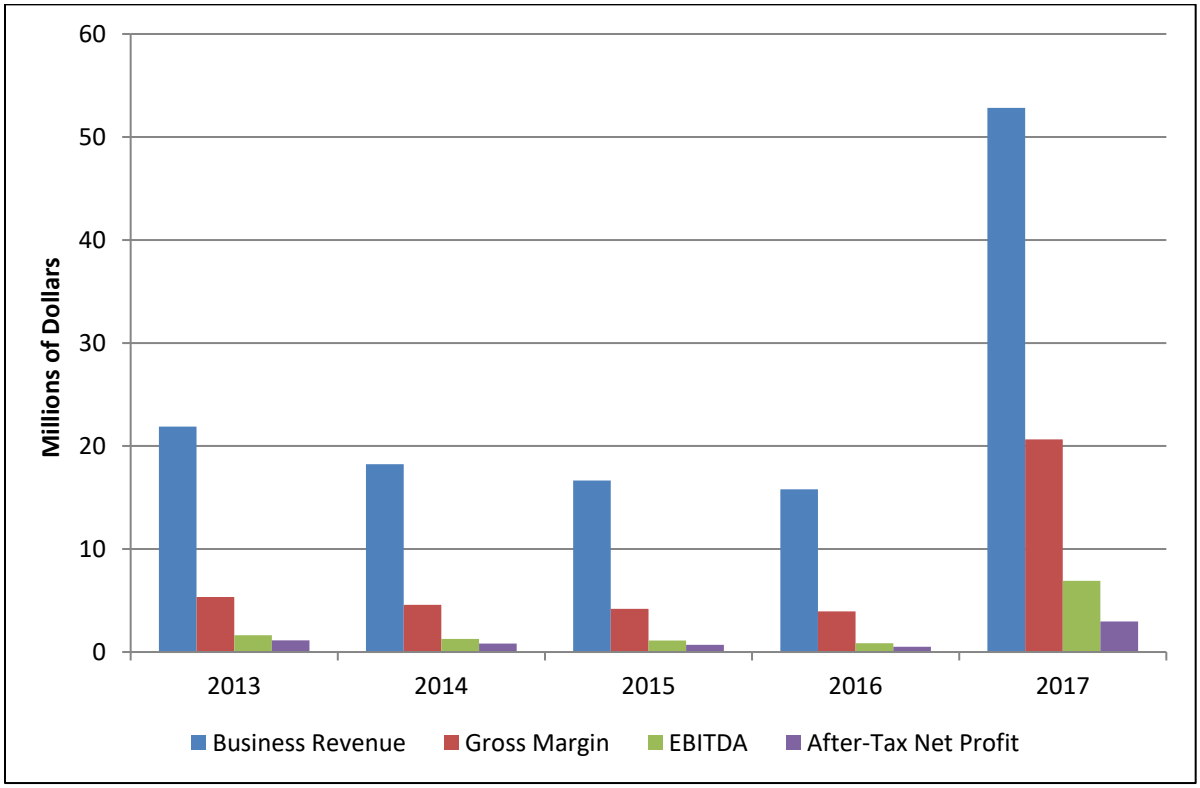
In recent years, plateaued energy demand and low interest rates have created a market environment that encourages consolidation to cut costs. Bizminer reports show evidence of consolidation among large firms. Specifically, as seen in Figure 6, the reports estimate the following:[13]

- Average business revenue fell steadily between 2013 and 2016 from $22 to $16 million. In 2017, average business revenue more than tripled from the previous year, totaling $53 million.

[13] Bizminer. 2018. Industry Financial Report NAICS 2211.

- Total liabilities, which had fallen steadily between 2013 and 2016 (from $18 to $14 million), increased to $110 million in 2017.
    - Total current liabilities fell from $5 million to $4 million between 2013 and 2016 before rising to $23 million in 2017.
    - Total long-term liabilities fell from $13 million in 2013 to $10 million in 2016 and increased to $87 million in 2017.
- $157 million in total assets in 2017, up from $21 million in 2016 and average current assets (relatively liquid assets with a relatively quick turnaround cycle) grew from $6 million in 2016 to $23 million in 2017 and net fixed assets grew from $10 million to $91 million.
- As discussed above, the number of firms that Bizminer analyzes each year decreased steadily between 2013 and 2017, from over 4,000 to around 2,600.

Figure 6. Bizminer's Estimated Earnings and Profit Metrics for the Average Firm under NAICS 2211



Source: Bizminer 2018.

Bizminer findings may be largely explained by industry consolidation, but to some extent may also reflect biases in the Bizminer data towards large firms. However, other sources also indicate rapid market consolidation in the industry. According to a Bloomberg article, in 2017, the utilities industry experienced the most acquisitions in a decade, totaling $68.2 billion.[14]

[14] Chediak, M., Collins, R., and Polson, J. 2018. Utility M&A Is So Hot Not Even Berkshire's Billions Won a Bid. Bloomberg. Accessed at https://www.bloomberg.com/news/articles/2018-01-03/utility-m-a-is-so-hot-not-even-berkshire-s-billions-won-a-bid.

Unprecedented market consolidation in recent years is a likely explanation for the industry's recent liquidity issues and potentially elevated long-term debt risk. Market volatility from low natural gas and wholesale electricity prices combined with low interest rates in recent years incentivized M&A activity for companies seeking to increase financial stability, reduce risk, and establish more predictable earnings.[15] Recent examples of high-profile M&A activities include:

- Sempra Energy's $9.45 billion acquisition of Energy Future Holdings Corporation in March 2018[16];
- Vistra Energy's $1.74 billion acquisition of Dynegy Inc. in April 2018[17]; and
- The $15 billion merger of Westar Energy Inc. and Great Plains Energy Inc. in June 2018.[18]

High liabilities and capital costs associated with consolidation may negatively affect financial ratios in the short term but resolve in the long term. Thus, many issues highlighted by Bizminer and RMA reports may be temporary with positive long-term effects.

Another possible contributor to unusual financial performance in recent years is the high number of conversions from coal to other fuel types. Since 2010, approximately 40 percent of U.S. coal-fired power plant capacity has been shut down or designated for closure.[19] Many coal-fired electric power generators have opted to convert coal plants into gas-fired generation plants due to continued low natural-gas prices. Approximately 85 plants (18 percent of coal-fired electric power generation plants) that were open in 2014 have closed or converted to another fuel type. Between 2000 and 2015, 545 coal-fired electric generation units with almost 50,000 megawatts of capacity were retired.[20]

Figure 7 demonstrates the trend away from coal-fired generation, showing that coal accounts for more than a quarter of U.S. electric generation capacity, but there are no new investments in coal generation. Converting plants involves high capital costs (and may lead to liquidity issues) and a short-term lull in profitability before new capacity productivity can be realized. However, this diversification reduces dependency on any one fuel type and may reduce risk in the long term. Additionally, reinvestments lead to long-term profitability as companies convert to more efficient capacity.

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[15] Deloitte. 2018. Power and Utilities: Accounting, Financial Reporting, and Tax Research Guide. Accessed at https://www2.deloitte.com/content/dam/Deloitte/us/Documents/energy-resources/us-er-power-utilities-accounting-financial-reporting-and-tax-research-guide.pdf.

[16] Sempra Energy. 2018. Sempra Energy Completes Acquisition of Majority Stake in Oncor. Accessed at https://www.sempra.com/newsroom/press-releases/sempra-energy-completes-acquisition-majority-stake-oncor-0.

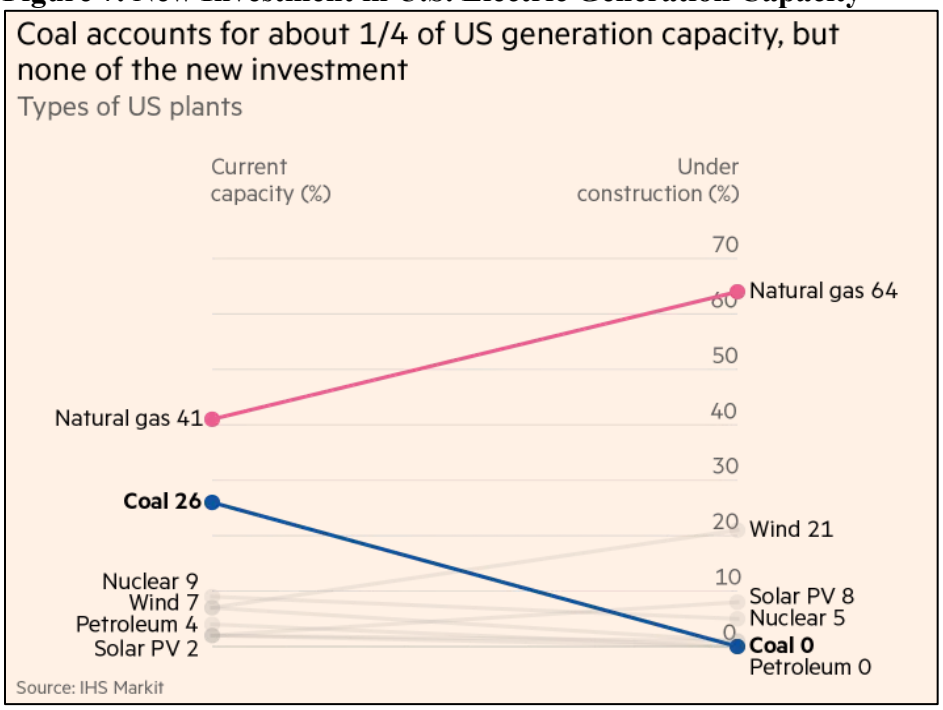
[17] Walton, Robert. As market pressures mount for IPPs, Vistra, Dynegy complete $1.74B merger. Utility Dive. Accessed at https://www.utilitydive.com/news/as-market-pressures-mount-for-ipps-vistra-dynegy-complete-174b-merger/520918/.

[18] Gheorghiu, Lulia. State regulators approve Westar, Great Plains Energy $15B merger. Utility Dive. Accessed at https://www.utilitydive.com/news/state-regulators-approve-westar-great-plains-energy-15b-merger/524471/.

[19] American Coalition for Clean Coal Electricity (as cited in Natter, Ari. 2018. Coal Plants Keep Shutting Despite Trump's Order to Rescue Them. Bloomberg. Accessed at https://www.bloomberg.com/news/articles/2018-06-18/coal-plants-keep-shutting-despite-trump-s-order-to-rescue-them.)

[20] Raimi, Daniel. 2017. Decommissioning US Power Plants: Decisions, Costs, and Key Issues. Resources for the Future.

Figure 7. New Investment in U.S. Electric Generation Capacity



Source: Crooks and Kao 2017.[21]

Industry Default Risk and Examples

Despite generally low default risk in the electric power generation, transmission, and distribution industry, some firms have not maintained financial stability. This section examines the industry's relative volatility and discusses outcomes of high-profile bankruptcy cases in recent years. The discussion relies on two main sources: 2018 U.S. Cost of Capital Valuation Handbook[22] and UCLA-LoPucki Bankruptcy Research Database[23].

The Cost of Capital Valuation Handbook's primary source for company-level data in its annual reports is S&P's Research Insight database. Of the 70 companies analyzed in NAICS 221[24], Exelon Corporation, Duke Energy Corporation, and The Southern Company are the largest in terms of sales. The report considers seven of the 70 companies (10 percent) in the industry to be at high financial risk.

The 2018 U.S. Cost of Capital Valuation Handbook provides estimates that measure the industry's relative volatility. Specifically, Beta estimates in the 2018 Cost of Capital book estimate industry risk or volatility relative to the overall market. A Beta value of one indicates that an industry's volatility is in line with the overall market. Values above one indicate

[21] Crooks, E. and Kao, J. 2017. The Future of Coal in Seven Charts. Financial Times. Accessed at https://www.ft.com/content/82f9087c-9cdd-11e7-8cd4-932067fbf946.

[22] Duff & Phelps. 2018. 2018 Valuation Handbook: U.S. Industry Cost of Capital. Duff & Phelps, LLC. Chicago, IL. Print.

[23] Lynn M. LoPucki and UCLA School of Law. 2018. Bankruptcy Research Database. Accessed at http://lopucki.law.ucla.edu/index.htm.

[24] The reports analyze industries by Standard Industrial Classification (SIC) code rather than NAICS code; this analysis considers SIC code 49, Electric, Gas, and Sanitary Services, which is equivalent to NAICS 221.

relatively more volatile industries and values below one show less volatility than the general market. The leveraged Beta value for the median company in NAICS 221 in 2018 was 0.30, significantly less volatile than the U.S. market. The Beta value for the seven companies labeled as high financial risk in the industry is 0.89, also below the market's overall risk.

Despite generally low risk, the industry has experienced some notable bankruptcies in recent years. UCLA's Prof. LoPucki reports bankruptcy filings by industry for large (assets greater than $100 million 1980 dollars) public companies. Between 2005 and 2018, UCLA LoPucki database reports two or fewer bankruptcies annually under NAICS 221[25], with no Chapter 11 filings (a form of bankruptcy filing for businesses that involves reorganization of debt and assets) between 2006 and 2010. However, cheap natural gas prices in recent years pushed electricity prices down, diminishing margins for power generation companies and leading to debt default. Nevertheless, many firms that filed for Chapter 11 emerged from bankruptcy and continue to operate. The following recent examples of bankruptcies from UCLA LoPucki database provide context for default cases and illustrate bankruptcy outcomes in the industry.

- Pacific Gas & Electric (PG&E): PG&E filed for bankruptcy in January 2019 and the case is currently pending.[26] The company engages in diverse activities under NAICS 2211, including nuclear, fossil fuel, and renewable source electric power generation and electric power transmission. Revenues were stable between 2015 and 2017, with a peak of $17.7 billion in 2016.[27] However, PG&E declared bankruptcy in 2019 due to outstanding liability payments associated with wildfires across California in 2017 and 2018.
- GenOn Energy: When GenOn Energy, a subsidiary of NRG Energy, filed for bankruptcy in June 2017, it owned 32 power plants across 18 states, with its $4.9 billion in pre-petition assets making it one of the ten largest public bankruptcies that year.[28] Sixty-one percent of its plants operated on gas, 27 percent on coal, and the remaining 12 percent on oil. The filing followed accusations that parent company NRG Energy improperly extracted over $520 million from the subsidiary during a restructuring agreement.[29] GenOn reorganized and continues to operate, generating $1.5 billion in sales in 2017.[30]
- FirstEnergy Solutions: FirstEnergy Solutions, a generation subsidiary of FirstEnergy Corporation, filed for bankruptcy in March 2018. A year later, the case is still pending though the company hopes to emerge from bankruptcy in late 2019 through a restructuring agreement. The company struggled to make money from coal and nuclear plants in unfavorable market conditions and retired numerous unprofitable plants.

[25] The database analyzes industries by SIC code rather than NAICS code; this analysis considers SIC code 49, Electric, Gas, and Sanitary Services, which is equivalent to NAICS 221.

[26] As of March 2019.

[27] D&B Hoovers. N.d.

[28] New Generation Research, Inc. BankruptcyData's 2017 Corporate Bankruptcy Review. BankruptcyData. Accessed at https://www.bankruptcydata.com/public/assets/filemanager/userfiles/BankruptcyData_2017_Corporate_Bankruptcy_Review.pdf.

[29] Scurria, Andrew and Fitzgerald, Patrick. 2017. GenOn Energy Files for Chapter 11 Bankruptcy Protection. The Wall Street Journal. Accessed at https://www.wsj.com/articles/genon-energy-files-for-chapter-11-bankruptcy-protection-1497445051.

[30] D&B Hoovers. N.d.

Following its pending emergence from bankruptcy, FirstEnergy Solutions intends to continue retiring coal and nuclear plants.[31]

- Energy Future Holdings Corporation: Energy Future Holdings Corporation filed for bankruptcy in April 2014. With most power generation coming from coal and nuclear power plants, Energy Future Holdings Corporation was not competitive following a drop in natural gas prices. The company emerged from bankruptcy and continues to operate under parent company Sempra Energy.

Generally, bankruptcies in NAICS 2211 were either the result of unforeseen factors (e.g., California wildfire liability in the case of PG&E) and/or high dependency on electric generation, specifically fossil fuel and nuclear generation (e.g., FirstEnergy and Energy Future Holdings Corporation). Firms that relied on coal and nuclear power generation struggled to compete with cheap natural gas. As discussed above, the industry is moving away from coal-fired electric generation and diversifying its production, moving towards more efficient and profitable fuel sources. This transition reduces dependency on any one fuel type and therefore reduces long-term risk. Additionally, many companies that filed for Chapter 11 in recent years restructured their debt and continue to operate without impairment of environmental liability.

Environmental Liabilities Under Chapter 11 Bankruptcy[32]

As discussed above, firms may file for bankruptcy protection under Chapter 11 of the Bankruptcy Code, which provides for reorganization, including restructuring of the firm's liabilities. Generally, firms continue to be liable for environmental compliance obligations in Chapter 11 debt restructuring. Sections 101(5) and 1141(d) of the Bankruptcy Code, 11 U.S.C. secs. 101(5), 1141(d), only provide for a discharge of monetary rights to payment and not for equitable remedies such as compliance obligations where the Government has not sought the payment of money.[33] Moreover, reorganized debtors that own contaminated or defective property are liable to protect public health and safety like all owners and operators of property regardless of the origin of the problem as no one is permitted to maintain a nuisance.[34]

Precedents set in bankruptcy court cases disallow pre-bankruptcy siphoning off environmental liabilities from other company assets so as to render a company unable to comply with its compliance obligations. For example, in the Tronox Inc. v. Kerr-McGee Corp case in New York, the court found the separation of a successful energy business from a failing chemical company fraudulent, as the division was intended to isolate valuable assets from critical liabilities.[35]

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[31] Walton, Robert. 2019. FirstEnergy Solutions Reaches Restructuring Agreement, Could Emerge from Bankruptcy in 2019. UtilityDive. Accessed at https://www.utilitydive.com/news/firstenergy-solutions-reaches-restructuring-agreement-could-emerge-from-ba/546677/.

[32] Note that this discussion is not specific to NAICS 2211, but is broadly applicable to all firms in the U.S. that may have environmental liabilities and be under Chapter 11 bankruptcy protection. Also note that this brief overview does not constitute an exhaustive legal analysis of this complex issue.

[33] United States v. Apex Oil Co., 579 F.3d 734 (7th Cir. 2009); In re Torwico Electronics, Inc., 8 F.3d 146 (3d Cir. 1993); In re Chateaugay Corp., 944 F.2d 997 (2d Cir. 1991); In re Mark IV Indus., Inc., 438 B.R. 460 (Bankr. S.D.N.Y. 2010), aff'd, 459 B.R. 173 (S.D.N.Y. 2011).

[34] In re CMC Heartland Partners, 966 F.2d 1143 (7th Cir. 1992); see Ohio v. Kovacs, 469 U.S. 274 (1985).

35 In re Tronox Inc., 503 B.R. 239 (Bankr. S.D.N.Y. 2013)

Another court case, Midlantic National Bank v. NJDEP, limited debtors' ability to abandon contaminated property in any way that violates laws reasonably designed to protect the public health or safety from identified hazards.[36] At the same time, each bankruptcy proceeding is case- and company-specific and decisions and outcomes may differ from those described above.

Finally, bankruptcy provisions ensure that companies in Chapter 11 are subject to the same enforcement proceedings as non-debtor entities. These provisions require entities to comply with applicable state and federal laws, including financial assurance requirements, while in debt restructuring and enable governments to take enforcement action in case of noncompliance.[37] Additionally, an enforcement action resulting in a fine for post-petition violations is generally classified as an administrative expense.[38]

Accounting and Funding for Environmental Liability

Firms in NAICS 2211 comply with Generally Accepted Accounting Principles (GAAP) to account for environmental liabilities. Although post-closure liabilities are not specifically funded under GAAP, environmental liabilities are accounted for through depreciation over time. Upon construction of the facility or recognition of the environmental liabilities, firms must recognize that liability on their balance sheets and correspondingly increase the cost of the asset by the amount of the environmental liability. The increased asset cost is then depreciated over the life of the asset.[39] Federal Energy Regulatory Commission (FERC) accounts record:

1. Costs of legal liabilities related to asset retirement,
2. Changes in such liabilities over time,
3. Capitalization of liability for asset retirement obligation (ARO),
4. Associated depreciation expense, and
5. Gains or losses from settlement of AROs.[40]

Firms in regulated markets (see above) are particularly incentivized to report depreciation associated with environmental liabilities because their costs are recovered through rates.

Apart from nuclear power generation plants, though these costs are recognized in the companies' financial statements, they are not usually fully funded, presenting a potential risk to the tax payer. Nuclear power generation plants, on the other hand, adhere to additional regulations set forth by the Nuclear Regulatory Commission. Under these regulations, post-closure liability is fully funded with respect to radiological standards, further reducing the financial risk associated with these firms.

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36 Midlantic Nat'l Bank v. N.J. Dep't of Envtl. Prot., 474 U.S. 494 (l986)

37 See 11 U.S.C. sec. 362(b)(4); 28 U.S.C. sec. 959(b).

38 In re Munce's Superior Petroleum Products, Inc., 736 F.3d 567 (1st Cir. 2013).

39 Jones Day. 2003. FERC Issues New Rules Governing the Accounting, Reporting and Rate Filing Requirements for Asset Retirement Obligations. Accessed at https://www.jonesday.com/FERC-Issues-New-Rules-Governing-the-Accounting-Reporting-and-Rate-Filing-Requirements-for-Asset-Retirement-Obligations-04-21-2003/#.

40 Ibid.

Further Consideration of Specific NAICS 2211 Subsectors

The remainder of this document discusses the following subsectors of further significance to the proposed rulemaking: NAICS 22112, Fossil Fuels and especially Coal-fired Electric Power Generation; NAICS 221113, Nuclear Power Generation; NAICS 221111, Hydroelectric Power Generation; and NAICS 22112, Electric Power Transmission, Control, and Distribution. These specific subsectors were further considered, because it was in these subsectors that relevant damage cases were identified and evaluated for purposes of EPA's regulatory decision making for the proposed rule.

An industry profile, potential universe of regulated industries, and financial summary is provided for each subsector. Subsectors are evaluated individually, although, as discussed above, most firms in the industry diversify across subsectors. As a result, each subsector's financial health and risk are not indicative of the financial wellbeing of any individual firm or the industry as a whole.

UCLA LoPucki and the Cost of Capital Valuation Handbook do not provide reports at the subsector level. Therefore, financial discussion at the subsector level relies on two main sources: RMA reports that provide sector-level financial outcomes and ratios by asset class and D&B Hoovers,[41] a business research company that provides firm-level financial statements for top generators in each subsector. RMA reports consider firms with up to $250 million in assets, excluding large firms in the industry while D&B Hoovers considers large, publicly traded firms. Thus, D&B Hoovers firm-level reports supplement RMA data to provide include large firms. Nevertheless, the sample of available data remains limited and is not representative of all firms in the subsectors.

I. NAICS 221112: COAL-FIRED ELECTRIC POWER UTILITIES

Industry Profile (NAICS 221112)

In 2017, coal was the second largest energy source in the U.S., behind natural gas, and made up approximately 30 percent of electric generation with 1.2 trillion kilowatt hours.[42] However, coal generation has been on a downward trend over the last decade. In 2008, coal-fired electric generation totaled almost 2 trillion kilowatt hours.[43] Coal production in 2018 fell three percent from 2017 and EIA predicts that coal production in 2019 and 2020 will fall another three and seven percent respectively (see Figure 8).[44]

According to EIA, about 70 percent of U.S. coal production in 2017 occurred in the following five states:[45]

- Wyoming (41 percent)

[41] D&B Hoovers. N.d.

[42] EIA. N.d.

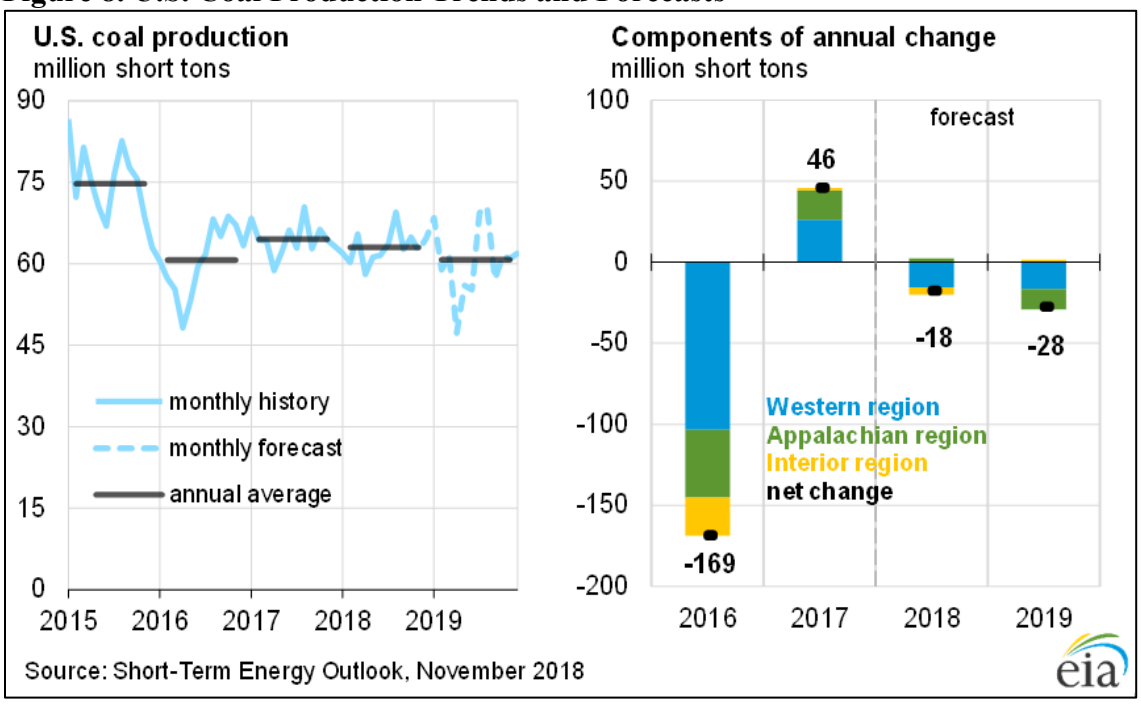
[43] Ibid.

[44] EIA. 2019. Short-Term Energy Outlook: Coal. Accessed at https://www.eia.gov/outlooks/steo/report/coal.php.

[45] EIA. N.d. Frequently Asked Questions. Accessed at https://www.eia.gov/tools/faqs/faq.php?id=427&t=3.

- West Virginia (12 percent)
- Pennsylvania (6 percent)
- Illinois (6 percent)
- Kentucky (5 percent)

Figure 8. U.S. Coal Production Trends and Forecasts



Source: EIA 2019.

As discussed above (see Consolidation and Subsector Diversification section), many coal plants faced financial difficulty in recent years and opted to close or convert to other fuel types. A list of active coal plants identified for CCR rulemaking in 2014[46] was updated to reflect the current status of the 2014 plants and determine trends in ownership, conversions to other fuel types, and closures. Approximately 86 coal plants (18 percent of coal-fired electric power generation plants) have changed ownership since 2014 (including M&A). While most coal plants are owned and operated by large firms, cities across the country owned 43 coal plants (9 percent of total number of coal plants) in 2014. However, five of these 43 coal plants owned by cities have since closed or converted to another fuel type (12 percent).

In 2014, 10 parent companies owned 172 plants, about 33 percent of coal-fired electric power generation plants. These companies are: NRG, AEP, Duke Energy, Southern Company, Berkshire Hathaway, Dominion, Dynegy, FirstEnergy, Alliant Energy Corp., and Xcel Energy Inc. By 2017, 39 of those 172 plants (about 23 percent) had either closed or converted to a different fuel type. Financial data for eight of the ten parent companies are provided in the Financial Summary subsection below.

Potential Universe of Regulated Entities (NAICS 221112)

EIA table 923 in 2017 and an EPA internal data set[47] which was developed as part of the proposed CCR rulemaking and updated in November of 2018 provide a comprehensive list of coal plants. The EIA table lists all plants that operated in 2017 with coal as their fuel source while the EPA data set incorporates all coal plants with CCR units since 2015,

[46] EPA and ORCR. 2014. Regulatory Impact Analysis: EPA's 2015 RCRA Final Rule Regulating Coal Combustion Residual (CCR) Landfills and Surface Impoundments at Coal-Fired Electric Utility Power Plants. Accessed at https://www.regulations.gov/document?D=EPA-HQ-RCRA-2009-0640-12034.
[47] IEc. 2018. Internal memorandum prepared for EPA under Contract No. EP-W-12-013, Work Assignment 5-27.

whether the plant is operative or not. Thus, EIA table 923 is used to list all operating coal plants that fall under CCR unit regulations while the EPA data set appends the list to include coal plants that are no longer operating (and therefore are not listed in EIA table 923).

The universe of concern encompasses plants that are subject to the 2015 CCR rule.[48] Thus, coal plants are considered in this analysis if they meet the following criteria: active coal plants (i.e., plants burning coal) with only active CCR units, active plants with only inactive CCR units that stopped receiving CCR waste after the 2015 rule took effect, active coal plants with both active and inactive CCR units, and the same three categories for inactive plants (i.e., plants that closed or stopped burning coal after 2015). Plants are considered active if they have positive net generation from coal in the year 2017.

As Figure 9 shows, the final universe that meets these criteria consists of 300 plants. Most (59 percent) coal-fired plants in the final universe are active coal plants with only active CCR units. About 22 percent of the final universe are inactive coal plants with only active CCR units. Of the coal plants in the final universe, 69 percent are active, and the remaining 31 percent are inactive. Many (44 percent) plants in the final universe operate both dry disposal CCR units and impoundments while 34 percent operate impoundments alone and the remaining 22 percent have only dry disposal units on-site. According to an analysis of public monitoring data, most CCR units have leaked toxic chemicals in nearby groundwater, many above EPA's threshold levels.[49]

Figure 9. Universe of Regulated Entities - Coal

CCR Unit Type	Active Coal Plant with Only Active CCR Units	Active Coal Plants with both Active and Inactive CCR Units	Active Coal Plant with Only Inactive CCR Units	Inactive Coal Plants with only Active CCR Units	Inactive Coal Plants with both Active and Inactive CCR Units	Inactive Coal Plants with only Inactive CCR Units	Final Universe
Dry Disposal Only	45	0	0	21	0	0	**66**
Impoundment Only	43	8	2	23	4	21	**101**
Both Impoundment and Dry Disposal	88	21	0	21	3	0	**133**
Total	**176**	**29**	**2**	**65**	**7**	**21**	**300**

Sources: EIA table 923, IEc 2018.

Financial Summary (NAICS 221112)

[48] For the purpose of this analysis, the universe of concern does not include plants with only "legacy units", units that stopped receiving CCR before the rule took effect in 2015. This could be: a) plants that closed altogether (or converted to natural gas) before 2015, and b) plants that still burned coal but had closed all on-site disposal units before 2015 (i.e., they send all CCR off-site). Some of the universe of current plants may also have legacy units along with active or inactive.

[49] Mufson, Steven and Dennis, Brady. March 4, 2019. *Report finds widespread contamination at nation's coal ash sites*. The Washington Post.

RMA and D&B Hoovers reports inform this financial summary, with RMA focusing on smaller firms (up to $250 million in total assets) and D&B Hoovers providing company-level financial statements for the top coal-fired electric generators.

RMA considers 22 firms under NAICS 221112, Fossil Fuel Electric Power Generation with up to $250 million in total assets. Half of the 22 firms included in the RMA report fall under the largest asset class ($100-250 million). RMA reports $681 million in net sales from fossil fuel electric generation in fiscal year 2017, about 7 percent of NAICS 2211's $9.9 billion in total net sales for all firms with under $250 million in assets. Total assets in the fossil fuel subsector (with assets below $250 million) totaled in $2.2 billion in 2017, accounting for 22 percent of the industry's $9.9 billion in total assets. The median fossil fuel electric power generation firm considered in RMA's report in 2017 had a current ratio and working capital turnover of 0.9 and -43.2 respectively, indicating insufficient funds to satisfy short-term obligations. Thus, RMA reports suggest relatively high default risk among firms that rely on coal-fired power generation.

As discussed above, 10 parent companies own about one-third of all coal-fired electric generation plants. These companies hold assets well above the $250 million RMA limit and therefore are not included in RMA reports. However, financial data for eight of the top 10 coal-fired electric generation companies are available on D&B Hoovers.[50]

Figure 10 shows total revenues and net income for these eight companies. Firms that generate the most coal-fired electricity (with available data) are included in the table, though financial data in the table are firm totals and are not specific to coal generation. Duke Energy had the largest total revenue in 2015, 2016, and 2017 with $23.6 billion. Average revenue for the 8 firms was $13.6 billion in 2017 and the total revenue for the firms was 108.8 billion that same year. Net income for all 8 firms totaled $8.5 billion in 2017, up from $6.5 billion in 2015 and $1.9 billion in 2016.

Figure 11 then presents the current ratio for the eight of the top 10 coal-fired electric generators for which data are available. The current ratio is a liquidity and efficiency ratio that measures a firm's ability to pay off its short-term liabilities with its current assets. The firms generally have insufficient liquid assets to cover their short-term debt; the average current ratio for the eight firms remained well below 1.0, ranging from 0.70 to 0.84. As large firms were involved in much of the consolidation through M&A in recent years, this trend is consistent with the suggestion that liquidity issues stem from rapid industry consolidation and will resolve under more typical conditions.

[50] Data for Berkshire Hathaway and NRG are not available.

Figure 10. Total Revenues and Net Income of Top Coal-Fired Electricity Generators (Millions of Dollars)[A]

Firm	Metric	2017	2016	2015
AEP	Total Revenue	15,425	16,380	16,453
	Net Income	1,913	611	2,047
Alliant Energy Corp.	Total Revenue	3,382	3,320	3,254
	Net Income	468	382	388
Dominion	Total Revenue	12,586	11,737	11,683
	Net Income	2,999	2,123	1,899
Duke Energy	Total Revenue	23,565	22,743	22,371
	Net Income	3,059	2,152	2,816
FirstEnergy Corp.	Total Revenue	14,017	14,562	15,026
	Net Income	-1,724	-6,177	578
Southern Company	Total Revenue	23,031	19,896	17,489
	Net Income	880	2,493	2,421
Vistra Energy Corp.[B]	Total Revenue	5,430	5,164	5,370
	Net Income	-254	-819	-4,677
Xcel Energy Inc.	Total Revenue	11,404	11,107	11,024
	Net Income	1,148	1,123	984
Total	**Total Revenue**	**108,840**	**104,909**	**102,670**
	Net Income	**8,488**	**1,888**	**6,457**
Average	**Total Revenue**	**13,605**	**13,114**	**12,834**
	Net Income	**1,061**	**236**	**807**

Source: D&B Hoovers N.d.

Notes: A. Firms that generate the most coal-fired electricity and have available data are included in the table, though financial data in the table are totals for each firm and not specific to coal generation.
B. Dynegy merged with Vistra Energy Corp. in 2018

Figure 11. Current Ratio of Top Coal-Fired Electricity Generators [A]

Firm	2017	2016	2015	2014	2013
AEP	0.51	0.64	0.57	0.56	0.71
Alliant Energy Corp.	0.42	0.75	0.61	0.86	0.71
Dominion	0.45	0.52	0.52	0.78	0.85
Duke Energy	0.68	0.70	0.73	1.03	1.22
FirstEnergy Corp.	0.76	0.41	0.54	0.60	0.53
Southern Company	0.74	0.75	0.71	0.65	1.02
Vistra Energy Corp.[B]	1.98	1.64	1.23	N/A	N/A
Xcel Energy Inc.	0.73	0.88	0.68	0.83	0.88
Average	**0.78**	**0.79**	**0.70**	**0.76**	**0.84**

Source: D&B Hoovers N.d.

Notes: A. Firms that generate the most coal-fired electricity and have available data are included in the table, though financial data in the table are totals for each firm and not specific to coal generation.
B. Dynegy merged with Vistra Energy Corp. in 2018.

Figure 12 presents working capital turnover for the eight of the top 10 coal-fired electricity generating firms for which data are available. Average working capital turnover for the eight firms is negative in 2015, 2016, and 2017. A negative working capital turnover occurs when current liabilities are greater than current assets, resulting in a negative working capital and inability to satisfy current obligations.

Figure 12. Working Capital Turnover for Top Coal-Fired Electricity Generators [A]

Firm	2017	2016	2015	2014	2013
AEP	-3.84	-4.73	-5.42	-4.70	-8.22
Alliant Energy Corp.	-2.72	-11.65	-6.11	-19.52	-7.76
Dominion	-2.37	-3.04	-2.97	-7.86	-12.45
Duke Energy	-5.85	-6.48	-7.27	65.82	12.16
FirstEnergy Corp.	-14.47	-3.49	-5.86	-6.83	-4.11
Southern Company	-6.54	-6.23	-6.72	-5.96	191.99
Vistra Energy Corp.[B]	4.11	5.33	8.42	N/A	N/A
Xcel Energy Inc.	-2.73	-6.56	-2.29	-3.99	-6.91
Average	-4.30	-4.61	-3.53	2.42	23.53

Source: D&B Hoovers N.d.

Notes: A. Firms that generate the most coal-fired electricity and have available data are included in the table, though financial data in the table are totals for each firm and not specific to coal generation.
B. Dynegy merged with Vistra Energy Corp. in 2018

II. NAICS 221113: NUCLEAR POWER GENERATION

Industry Profile (NAICS 221113)

Nuclear generation plants are highly regulated by NRC. NRC regulations cover facility decommissioning, including financial assurance for radioactivity. NRC ensures radioactively contaminated plant decommissioning is fully funded by requiring its licensees to report their decommissioning funds at least every two years, thus mitigating environmental liability risk. However, hazardous waste cleanup may not be fully funded and may pose potential risk.[51,52]

Nuclear power generation accounted for 20 percent of total US electric generation in 2017 with 805 billion kilowatt hours of electricity generation.[53] As of May 2018, 60 commercially operating nuclear power plants generated electricity using 98 nuclear reactors across 30 states, mostly in the eastern US (see Figure 13). Of the 60 nuclear plants, 31 sell electricity in competitive deregulated (merchant) wholesale markets.[54]

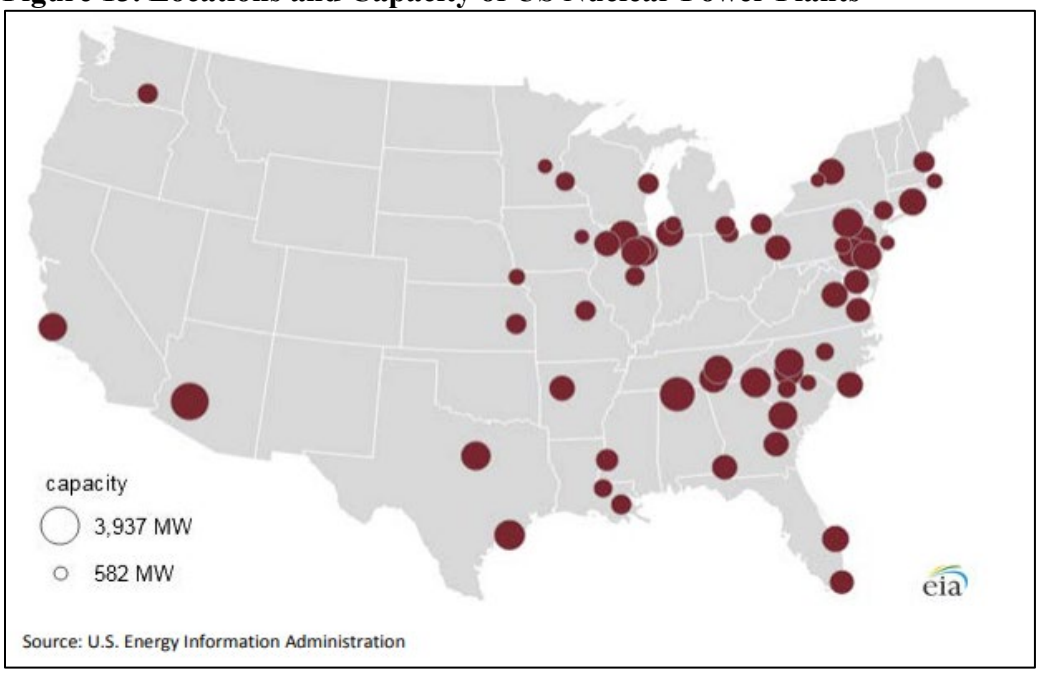
[51] U.S.NRC. N.d. Financial Assurance for Decommissioning. Accessed at https://www.nrc.gov/waste/decommissioning/finan-assur.html.

[52] U.S.NRC. N.d. Backgrounder on Decommissioning Nuclear Power Plants. Accessed at https://www.nrc.gov/reading-rm/doc-collections/fact-sheets/decommissioning.html.

[53] EIA. N.d.

[54] Ibid.

Figure 13. Locations and Capacity of US Nuclear Power Plants



Source: EIA[55]

Between 2013 and 2017, net nuclear power generation increased slightly from 789 to 805 billion kilowatt hours. 61 nuclear power plants generated these 805 billion kilowatt hours of electricity in 2017. [56] Five nuclear plants have closed since 2013. Low market prices have driven many smaller merchant plants out of the market if they cannot receive state price support. Smaller plants struggle to cover their fixed costs because they are unable to realize economy-of-scale benefits in negotiating contracts.[57] According to the Bloomberg New Energy Finance, more than 25 percent of nuclear power plants do not make enough money to cover their operating costs.[58]

Potential Universe of Regulated Entities (NAICS 221113)

The 61 commercial US nuclear power generation plants that operated in 2017 were owned by 27 parent companies and two cities.[59] Nuclear power plants were considered in the analysis if they were listed in EIA table 923 in 2017 under fuel type "Nuclear" (listed as NUC) and including Uranium, Plutonium, and Thorium. Operator names are provided for each plant in EIA table 923. Cleaning the operator names resulted in a comprehensive list of parent companies that owned nuclear power electricity generation in 2017. The following five parent companies accounted for 56 percent of total nuclear energy generation in 2017:

- Exelon (24 percent)

[55] EIA. 2018b. Nuclear Power Outlook. PDF. Accessed at https://www.eia.gov/outlooks/aeo/pdf/nuclear_power_outlook.pdf.

[56] Note that this value is as of 2017; according to EIA's 2018 data, 60 plants are now operating in the U.S.

[57] EIA. N.d.

[58] Loh, Tim. 2018. One-Fourth of U.S. Nuclear Plants are at Risk of Early Retirement. Bloomberg. Accessed at https://www.bloomberg.com/news/articles/2018-05-15/one-fourth-of-u-s-nuclear-fleet-is-at-risk-of-early-retirement.

[59] Note that this value is as of 2017; according to EIA's 2018 data, 60 plants are now operating in the U.S.

- Duke Energy (11 percent)
- Entergy (8 percent)
- Tennessee Valley Authority (7 percent)
- NextEra Energy (6 percent)

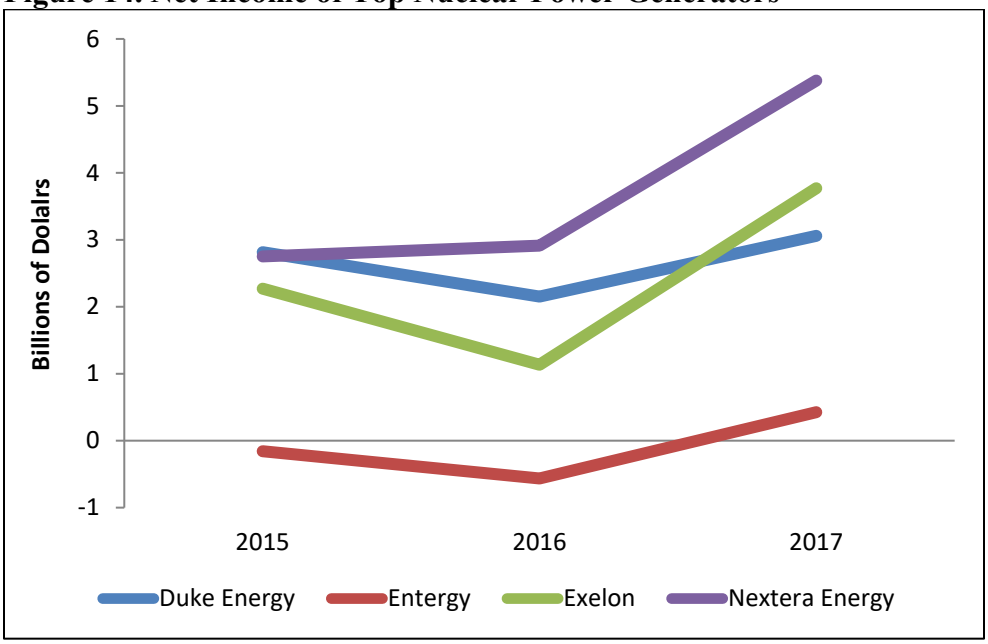
Financial Summary (NAICS 221113)

RMA does not report financial data for NAICS 221113. Thus, this section relies on D&B Hoovers reports for four of the top five firms in terms of nuclear power generation (above).[60] The four firms for which data are available make up about half of total U.S. nuclear power generation. Financial data included in this section reflect firm totals and are not specific to nuclear power generation as firms are diversified across multiple subsectors.

According to D&B Hoovers, in 2017, Duke Energy, Entergy, Exelon, and Nextera Energy reported revenues of $23.6, $11.1, $33.5, and $17.2 billion and net incomes of $3.1 billion, $425 million, $3.8 billion, and $5.4 billion, respectively.

Figure 14 shows net income for the four companies from 2015 to 2017. All four companies experienced net income growth in 2017. However, in 2017 Duke Energy, Entergy, and Nextera Energy had insufficient current assets to satisfy current liabilities, with current ratios below 0.7. Exelon reported slightly better liquidity, with a current ratio of 1.10, indicating sufficient funds to cover current liabilities but with little buffer.

Figure 14. Net Income of Top Nuclear Power Generators



Source: D&B Hoovers.

[60] Data for Berkshire Tennessee Valley Authority are not available through a Hoover's subscription.

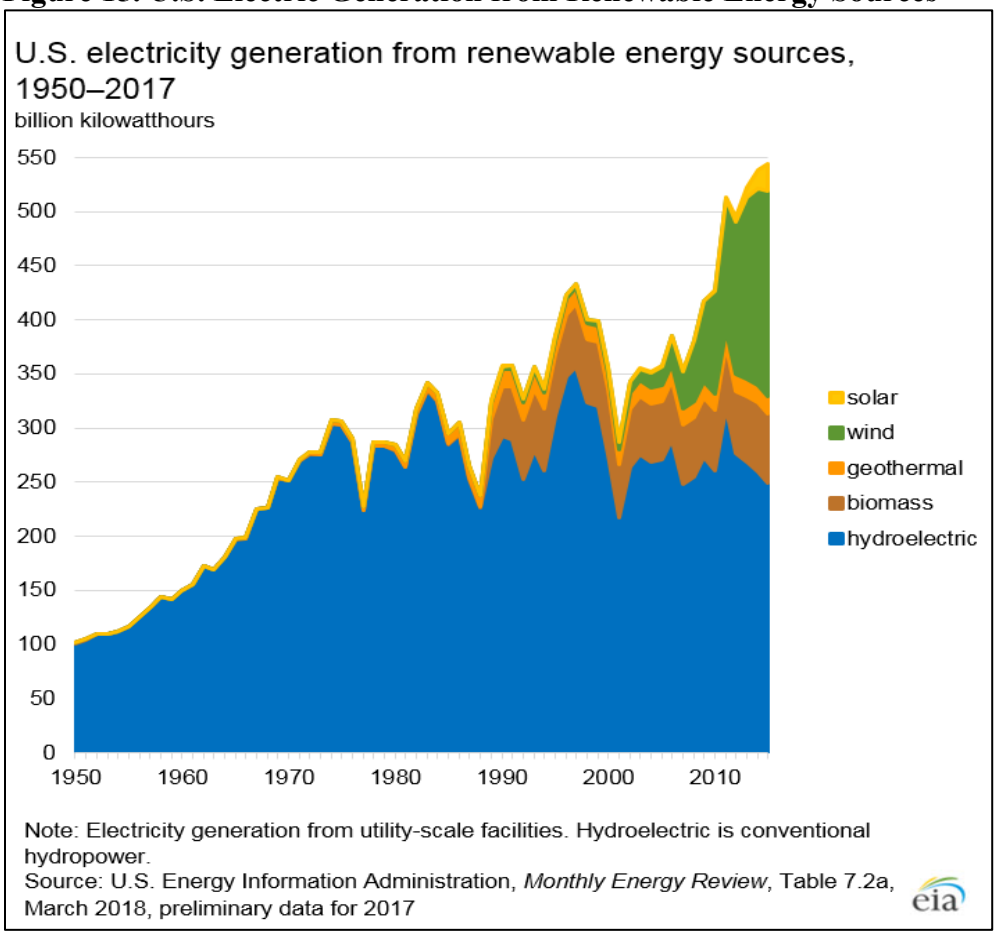
III. AICS 221111: HYDROELECTRIC POWER GENERATION

Industry Profile (NAICS 221111)

Hydropower plants produced 300 billion kilowatt hours in 2017 (7 percent of total US electricity generation and 44 percent of renewable energy generation)[61].

Figure 15 shows U.S. electric generation from renewable energy sources, such as hydropower.

Figure 15. U.S. Electric Generation from Renewable Energy Sources



Source: EIA 2018a.

Hydropower generation varies greatly by region and is especially prevalent in the northwest. Washington State has the highest hydropower capacity due to the highly dammed Columbia River and hydropower accounts for more than 70 percent of the state's electricity generation.[62] The top five states by hydroelectricity generation capacity in 2017 were as follows:

[61] EIA. 2018a.

[62] National Geographic. 2009. Hydropower. Accessed at https://www.nationalgeographic.com/environment/global-warming/hydropower/.

- Washington (27 percent)
- California (13 percent)
- Oregon (11 percent)
- New York (6 percent)
- Alabama (4 percent)

Potential Universe of Regulated Entities (NAICS 221111)

Hydropower plants are considered in this analysis if included in EIA table 923 in 2017 under fuel types "hydroelectric conventional" (HYC) or "hydroelectric pumped storage" (HPS). EIA table 923 provides operator names for each hydropower plant. About 1,467 plants with 450 operators generated hydropower or pumped storage hydropower in 2017. Between 2013 and 2017, hydroelectric power generation increased from 268 to 300 billion kilowatt hours. Pumped storage hydropower generated a net of negative 6.5 billion kilowatt hours in 2017.[63,64]

Financial Summary (NAICS 221111)

D&B Hoovers does not provide data for the top hydroelectric power generators: the U.S. Army Corp of Engineers, U.S. Bureau of Reclamation, and New York Power Authority as they are government or privately held entities. Thus, this section relies on data from RMA reports. The most recent data available from RMA for NAICS 221111 are from fiscal year 2015. In 2015, RMA included 27 firms in its analyses, spreading across all asset classes. Net sales totaled $678 million in 2015, down from $1.5 billion in 2012 while total assets fell from $2.6 billion in 2012 to $1.2 billion in 2015.

As shown in Figure 15, hydroelectric generation has fluctuated between 200 and 350 billion kilowatt hours since the late 1960s. Thus, the recent drop in hydroelectric generation (and resulting drop in revenues) is within the normal range of fluctuation. The current ratio for the subsector's median firm fell from 1.4 in 2012 to 1.2 in 2015. Nevertheless, a score above one indicates sufficient liquidity to satisfy short-term liabilities. Generally, the hydroelectric power subsector's default risk remains low.

III. NAICS 22112: ELECTRIC POWER TRANSMISSION, CONTROL, AND DISTRIBUTION

Industry Profile (NAICS 22112)

Electric power transmission, control, and distribution encompass establishments involved in bulk movement of electrical energy from a generating plant to an electrical substation

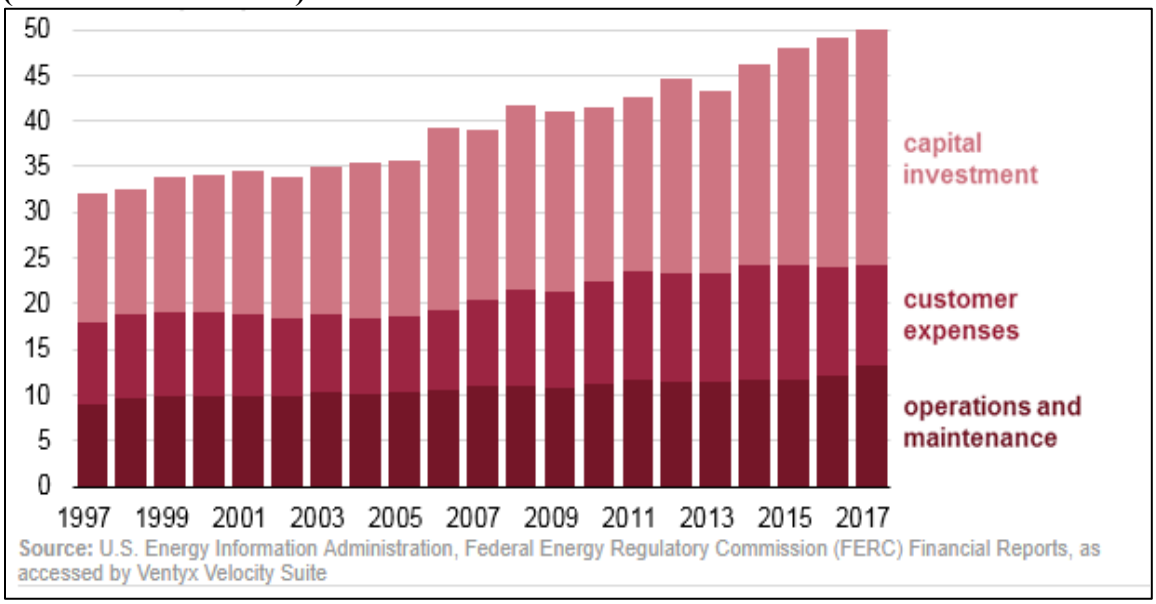
[63] HPS stores energy in the form of gravitational potential energy during periods of low demand so it can be used during periods of high demand. Although HPS improves efficiency and reliability, the process results in negative net electricity generation as electrically powered turbines force water uphill for storage.

[64] EIA. 2013. Pumped Storage Provides Grid Reliability Even with Net Generation Loss. Accessed at https://www.eia.gov/todayinenergy/detail.php?id=11991.

(transmission). Electrical substations transform the electrical energy to regulated and usable voltages (control). Finally, the regulated voltages of electricity are delivered to individual customers via power distribution lines (distribution). The electric power transmission, control, and distribution industry produced $169 billion in gross output in 2016, up from $155 billion in 2012.[65]

As shown in Figure 16, electric utilities' spending on electricity distribution systems has increased by 54 percent over the past 20 years, from $31 billion in 1997 to $51 billion in 2017, largely due to increased capital expenditures to update aging equipment.[66] Seventy percent of power transformers and transmission lines are 25 years old or older and 60 percent of circuit breakers are 30 years old or older.[67] Older, more populated systems require the most capital investments. As seen in Figure 17, the largest spending increases have occurred in the Northeast Power Coordinating Council (New York City and Boston), Reliability First (Chicago, Detroit, Philadelphia, Baltimore-Washington, DC), and the Western Electricity Coordinating Council (Los Angeles, San Francisco). [68]

Figure 16. Annual Electric Distribution System Costs for Major U.S. Utilities (Billions 2017 Dollars)



Source: EIA 2018c.

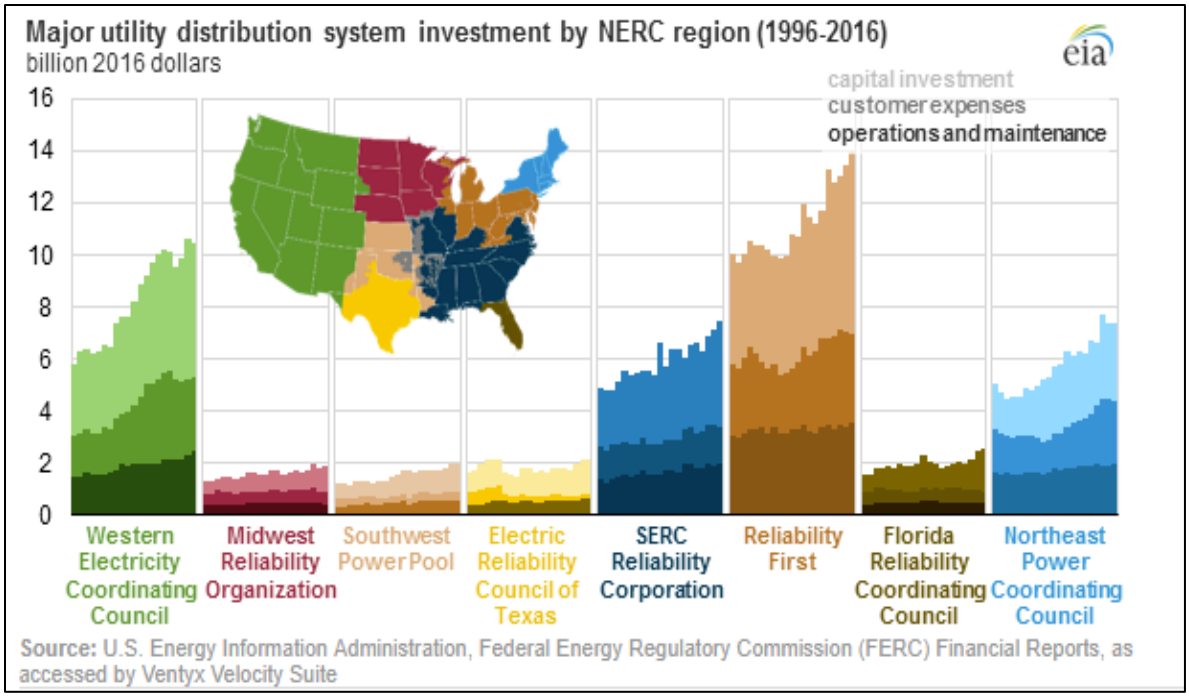
Figure 17. Major Utility Distribution System Investment by NERC Region (1996-2016, Billions 2016 Dollars)

[65] BEA (Bureau of Economic Analysis). 2017. Gross Output by Industry.

[66] EIA. 2018c. Today in Energy. Accessed at https://www.eia.gov/todayinenergy/detail.php?id=36675.

[67] U.S. Department of Energy. 2015. Quadrennial Technology Review 2015 Chapter 3: Enabling Modernization of Electric Power Systems. PDF. Accessed at https://www.energy.gov/sites/prod/files/2015/09/f26/QTR2015-3F-Transmission-and-Distribution_1.pdf.

[68] EIA 2018c.



Source: EIA 2018c.

Potential Universe of Regulated Entities (NAICS 22112)

Plants are considered under this subsector if they are listed in EIA table 860 as a transmission or distribution system owner. Cleaning the owner names resulted in a list of 954 companies. Almost half of 954 electric transmission, control, and distribution operators are cities, counties, towns, and villages. Most non-municipality owner entities remain regulated, thus reducing risk.

Financial Summary (NAICS 22112)

According to U.S Census data, in 2012, the total value of sales, shipments, receipts, revenues, or business done by NAICS 22112 was $310 billion, making up 72 percent of the industry total ($430 billion).[69] Many large firms involved in electric power generation also participate in transmission and distribution, benefitting from the subsector's low risk profile.

According to RMA reports, Electric Power Transmission, Control, and Distribution accounted for about 43 percent of NAICS 2211 net sales in 2017, with $4.3 billion across all asset classes. While net sales reported by RMA in 2017 are significantly lower than the 2015 total of $6.5 billion, in 2015 RMA collected data from 92 firms while in 2017 data were only available for 78 firms. The smaller sample is likely due to firms moving above RMA's $250 million asset limit; U.S. Census data report an increase in the number of establishments in NAICS 22112 between 2012 and 2016, revealing no evidence of closures. Most (about 53 percent) of sales in NAICS 22112 reported by RMA in 2017 came from the largest asset class, $100-$250 million. Total assets among all firms in NAICS 22112 were $5.3 billion in 2017, making up over half of the total assets in NAICS 2211. In 2017, the current ratio for

[69] U.S. Census Bureau: American FactFinder. 2016.

the median firm in the subsector was 1.1, indicating sufficient liquidity to satisfy short-term liabilities, though with little buffer.

Large firms excluded from RMA reports are captured in D&B Hoovers financial statements. Financial data for the top five parent companies in the subsector in terms of customers is presented below. Firms with the largest customer base are included in the table, though financial data in the table are totals for each firm and are not subsector-specific. As shown in Figure 18, the five companies generated $81.6 billion in revenues in 2018.

Figure 18. Total Revenue for Top Transmission, Control, and Distribution Companies, (Billions of Dollars)

Firm	2018	2017	2016
Consolidated Edison	12.3	12.0	12.1
Nextera Energy Inc.	16.7	17.2	16.1
Pacific Gas & Electric	16.8	17.1	17.7
Southern California Edison	12.3	11.8	11.5
The Southern Company	23.5	23.0	19.9
Total	**81.6**	**81.2**	**77.3**

Source: D&B Hoovers N.d.

Despite billions of dollars in annual revenue, the top five parent companies experienced liquidity issues in recent years. Specifically, current ratios for the five firms ranged from 0.22 to 0.89, indicated insufficient liquidity to cover short-term liabilities (see Figure 19). As noted above, PG&E, whose current ratio fell from 0.88 in 2017 to 0.22 in 2018 filed for bankruptcy in early 2019. For other companies, low current ratios may result from market consolidation and resolve under more normal market conditions, as discussed above.

Figure 19. Current Ratio for Top Transmission, Control, and Distribution Companies

Firm	2018	2017	2016
Consolidated Edison	0.62	0.72	0.89
Nextera Energy Inc.	0.36	0.64	0.68
Pacific Gas & Electric	0.22	0.88	0.81
Southern California Edison	0.52	0.43	0.64
The Southern Company	0.67	0.74	0.75

Source: D&B Hoovers N.d.

APPENDIX

Figure 20. Bizminer Industry Income and Expense Statement for the Average Firm in NAICS 2211 (number of firms analyzed ranged from 4,210 in 2013 to 2,635 in 2017)

Industry					
	2013	2014	2015	2016	2017
Business Revenue	21,877,099	18,236,552	16,650,308	15,793,211	52,826,395
Cost of Sales	16,535,374	13,649,524	12,463,298	11,848,871	32,191,460
Cost of Sales - Labor Portion	276,426	228,183	171,712	146,922	416,269
Gross Margin	5,341,725	4,587,028	4,187,010	3,944,340	20,634,935
Officers Comp.	263,197	205,691	248,610	266,069	391,377
Salary-Wages	714,595	658,643	603,816	646,040	2,354,736
Rent	229,135	149,647	113,608	117,513	448,116
Taxes Paid	418,690	410,846	368,902	390,810	2,298,486
Advertising	60,915	74,128	54,745	59,892	82,249
Benefits-Pensions	291,613	285,608	277,841	280,722	1,604,496
Repairs	230,467	174,373	175,944	184,057	1,083,551
Bad Debt	45,130	18,546	19,050	19,372	158,605
Sales, General, Admin & Misc.	1,452,614	1,332,882	1,202,526	1,120,619	5,296,768
EBITDA	1,635,369	1,276,664	1,121,968	859,246	6,916,551
Amortization Depreciation Depletion	823,100	674,667	681,238	701,817	5,100,070
Operating Expenses	4,529,456	3,985,031	3,746,280	3,786,911	18,818,454
Operating Income	812,269	601,997	440,730	157,429	1,816,481
Interest Income	54,471	43,403	81,158	75,634	383,144
Interest Expense	396,547	353,133	313,703	308,553	1,526,184
Other Income	1,236,137	951,205	848,292	858,353	3,829,974
Pre-Tax Net Profit	1,706,330	1,243,472	1,056,477	782,863	4,503,415
Income Tax	580,153	422,780	359,203	266,173	1,531,161
After Tax Net Profit	1,126,177	820,692	697,274	516,690	2,972,254
Discretionary Owner Earnings	2,212,474	1,701,050	1,627,122	1,484,576	8,463,701

Source: Bizminer 2018.

Figure 21. Bizminer Balance Sheet for the Average Firm in NAICS 2211

	Industry				
	2013	2014	2015	2016	2017
Cash	2,361,822	2,210,622	1,779,061	1,727,151	4,740,876
Receivables	3,187,544	2,880,125	2,708,433	2,615,406	9,622,214
Inventory	671,228	604,616	498,466	482,554	3,131,680
Other Current Assets	1,652,670	1,507,546	1,365,006	1,317,890	5,604,571
Total Current Assets	7,873,264	7,202,909	6,350,966	6,143,001	23,099,341
Gross Fixed Assets	29,451,635	26,273,143	22,418,760	21,252,246	196,988,187
Accum. Depreciation-Amortization-Depltn.	15,833,373	14,131,482	12,071,505	11,435,221	106,020,784
Net Fixed Assets	13,618,263	12,141,660	10,347,256	9,817,026	90,967,403
Other Non-Current Assets	6,139,937	5,673,224	5,257,885	4,898,090	43,352,331
Total Assets	27,631,464	25,017,793	21,956,107	20,858,117	157,419,075
Accounts Payable	1,824,979	1,592,537	1,525,355	1,429,177	7,454,069
Loans/Notes Payable	1,222,260	1,054,051	1,057,783	991,055	6,842,399
Other Current Liabilities	2,011,459	2,021,129	2,019,441	1,878,004	8,305,534
Total Current Liabilities	5,058,698	4,667,717	4,602,579	4,298,236	22,602,002
Total Long Term Liabilities	12,798,491	11,692,738	10,342,074	9,783,441	86,955,553
Total Liabilities	17,857,189	16,360,455	14,944,653	14,081,677	109,557,555
Net Worth	9,774,275	8,657,338	7,011,454	6,776,440	47,861,520
Total Liabilities & Net Worth	27,631,464	25,017,793	21,956,107	20,858,117	157,419,075

Source: Bizminer 2018

Figure 22. Bizminer Financial Ratios: Cash Flow-Solvency for the Average Firm in NAICS 2211

Financial Ratios: Cash Flow-Solvency	Industry				
	2013	2014	2015	2016	2017
Accounts Payable: Business Revenue	8.34	8.73	9.16	9.05	14.11
Current Ratio	1.56	1.54	1.38	1.43	1.02
Quick Ratio	1.10	1.09	0.97	1.01	0.64
Days Payable	40.28	42.59	44.67	44.03	84.52
Current Liabilities: Inventory	7.54	7.72	9.23	8.91	7.22
Net Working Capital: Business Revenue	0.13	0.14	0.11	0.12	0.01
Cost of Sales: Accounts Payable	9.06	8.57	8.17	8.29	4.32
Cost of Sales: Inventory	24.63	22.58	25.00	24.55	10.28

Source: Bizminer 2018

Figure 23. Bizminer Financial Ratios: Profitability for the Average Firm in NAICS 2211

Financial Ratios: Profitability	Industry				
	2013	2014	2015	2016	2017
EBITDA: Business Revenue (%)	7.48	7.00	6.74	5.44	13.09
Pre-Tax Return On Assets (%)	6.18	4.97	4.81	3.75	2.86
Pre-Tax Return on Net Worth (%)	17.46	14.36	15.07	11.55	9.41
Pre-Tax Return on Business Revenue (%)	7.80	6.82	6.35	4.96	8.52
Discretionary Owner Earnings	10.11	9.33	9.77	9.40	16.02
After-Tax Return On Assets (%)	4.08	3.28	3.18	2.48	1.89
After-Tax Return On Net Worth (%)	11.52	9.48	9.94	7.62	6.21
After-Tax Return On Business Revenue (%)	5.16	4.49	4.19	3.27	5.62

Source: Bizminer 2018

Figure 24. Bizminer Financial Ratios: Efficiency for the Average Firm in NAICS 2211

Financial Ratios: Efficiency	Industry				
	2013	2014	2015	2016	2017
Assets: Business Revenue	1.26	1.37	1.32	1.32	2.98
Days Inventory	14.82	16.17	14.60	14.86	35.51
Days Receivables	53.18	57.64	59.37	60.45	66.48
Current Asset Turnover	2.78	2.53	2.62	2.57	2.29
Fixed Asset Turnover (Business Revenue/Fixed Assets)	1.61	1.50	1.61	1.61	0.58
Gross Margin: Business Revenue	24.42	25.15	25.15	24.97	39.06
Sales Per Employee	921,860	975,521	985,044	1,006,188	1,039,975
Inventory Turnover	32.59	30.16	33.40	32.73	16.87
Receivables Turnover	6.86	6.33	6.15	6.04	5.49
Total Asset Turnover	0.79	0.73	0.76	0.76	0.34
Working Capital Turnover	7.77	7.19	9.52	8.56	106.22
Days Working Capital	46.96	50.74	38.33	42.63	3.44
Cash Turnover	9.26	8.25	9.36	9.14	11.14

Source: Bizminer 2018