



Mid Term Report

(Part I: External Environmental Analysis of
Calpine Corporation)

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Table of Contents

2.0	Company History	3
2.1	Background.....	3
2.2	Purpose of this study.....	4
3.0	External Analysis.....	4
3.1.	General Environmental Analysis	4
3.1.1	Demographic Segment	5
3.1.2.	Economic Segment.....	7
3.1.3.	Political/Legal Segment	8
3.1.4.	Socio-Cultural Segment	10
3.1.5	Technological Segment	11
3.1.6.	Physical Segment.....	12
3.1.7.	Driving Forces	14
3.2.	Industry Analysis	15
3.2.1.	Description of the Industry.....	16
3.2.2.	Industry Dominant Economic Features	17
3.2.3.	Market Size and Growth.....	17
3.2.4.	Industry Trends.....	22
3.2.5.	Five Forces Analysis.....	24
3.3	Competition Analysis.....	30
3.3.1	Industry Competitors	30
3.3.2	Rivals Anticipated Strategic Moves	30
3.3.3.	Key Success Factors	33
3.4.	Summary of Opportunities and Threats.....	36

2.0 Company History

Peter Cartwright and four of his co-workers founded Calpine Corporation in San Jose, California in 1984 with an initial investment of US \$1m. In 2009, however, the fortune 500 company permanently moved its headquarters to Houston, Texas. Calpine is publicly traded as NYSE:CPN and its website is www.calpine.com. Most of Calpine's operations are in Texas, California, Arizona, Colorado, and Oregon, as well as in Canada. Since 1989, the company has focused on "the acquisition, development, ownership, operation, and maintenance of gas-fired and geothermal power generation facilities" (http://www.calpine.com/about/oc_safety.asp).

2.1 Background

A historical financial data shows that the company grossed \$5.478 billion in 2012, \$6.301 billion in 2013, and \$8.030 billion in 2014 which is a 68% increase in revenue from 2012 to 2014. Calpine also earned a net income of \$639 million as of September, 2014, a strong indication of the profitability of the company (Guru Focus, 2014).

Calpine has the means to provide up approximately 27,000 MW of clean electricity to its customers in a total of 18 states in the U.S. and Canada. It currently also has 88 power generating facilities either in full operational capacity or under construction. These power plants are combined-cycle and cogeneration plants make up the largest for any one company in the U.S.

The electric company prides itself on its commitment to safety maintaining a low reportable incident record in the last several years. The level of commitment to environmentally conscience power generation is also a top priority for Calpine as the company has the lowest levels of emissions in the industry (Calpine, 2014). The primary mission of the Calpine is "to govern the Company with the vision to maximize value for its stakeholders, adhere to the laws of the

jurisdictions where the Company operates, and maintain high ethical standards, thereby building long term value for its stakeholders" (Calpine, 2014).

2.2 Purpose of this study

The purpose of this study is to come up with the possible problems facing Calpine Corporation and to communicate our findings by summarizing the results, conclusions, and recommendations for it to achieve a competitive advantage in the marketplace. In analyzing Calpine Corporation's current market position, the company's internal strength and weaknesses would be analyzed. Also, an analysis on the external opportunities and threats would be conducted in order to assess and determine how the company provides distinctive value for its customers and maintains that competitive edge.

First slide
Introduction

3.0 External Analysis

The external analysis of an industry refers to the studying the forces in the environment, that are out of the industry's control. This analysis will study the external factors of the electric service industry, which include: the general environment, aspects of the industry, and the industry's competitive environment. An external analysis is important to a company because such factors might affect its success.

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3.1. General Environmental Analysis

⇒ The General Environmental Analysis entails the assessment of external forces and factors and their probable effects on or within an organizations macro-environment. Ultimately it determines how those forces and conditions effect the organizations growth and success. One of several strategic tools that can be utilized to analyze these forces and factors is a variation of the PEST analysis, PESTAL. The PESTAL model comprises of six key Segments which are:

We have ~~decided~~ done a general "

Demographic Segment, Economic Segment, Political/Legal Segment, Socio-Cultural Segment, Technological Segment, and the Physical Segment.



3.1.1 Demographic Segment

Demographics are an important driving force in the power generating industry. Population size and growth, age distribution, income background, gender, marital status, educational levels, cultural and ethnic backgrounds, racial diversity, all play a major role in determining consumption patterns and consumer behavior in this industry. However, whether it is individuals, corporations or governments, people remain the main consumers and they continue to influence and shape the energy industry. The Independent Statistics & Analysis report from the U.S Energy Information Administration confirmed that “in 2012, about 461 billion kilowatt-hours (kWh) of electricity were used for lighting by the residential and commercial sectors. This was about 17% of the total electricity consumed by both of these sectors and about 12% of total U.S. electricity consumption” (EIA report, May 2014). Hence the overall increase or decrease of the human population will impact the electricity industry.

The past and future population trends have shown significant changes in the United States and

the world. Immigration, emigration, births and deaths have been significant factors for these changes in the population structure and many scholars believe that these factors will contribute to a continuous increase in the population for this century. Understanding who your consumers are among the various mixes of the population structure and being able to target their needs is a key factor in creating a competitive edge in the market place. According to Hackett of the Pew Research Center:

"The world's population as of 2014 was at 7.2 billion, according to the United Nations,
which celebrates World Population Day today (July 11, 2014). According to U.N. data,
half of the people around the globe (3.6 billion) live in just a half-dozen countries. China
has the world's largest population (1.4 billion), followed by India (1.3 billion). The next
most-populous nations – the United States, Indonesia, Brazil and Pakistan – combined
- have less than 1 billion people" (2014).

Interestingly, World Population Balance (2014) found that "Americans make up only 5% of the world's population and yet consume 20% of its energy!" Additionally, according to Passel and Cohn, "the population of the United States will rise to 438 million in 2050, from 296 million in 2005" (Pew Research Center, 2008). This data shows a significant trend on the world's consumption pattern of electricity and it is vital for the stakeholders to utilize this information along with other crucial factors in the industry to analyze, forecast and make predictions about the future of the respective companies. Meeting the growing demands for the ever increasing global population in general and the U.S. population in particular will continue to be a challenge for businesses operating in this industry.

← related

Ultimately, it is implied as well that a significant increase in population has had a direct relationship to the demand for electricity in the U.S. Moreover, the U.S. population has also become smarter and hence richer leaving them with more income to spend on appliances that rely on the availability of electricity.

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Commented [FE2]: It can be very productive if you add a graph of the US population ranging from 10-20 years ago to 10 years in to the future.

When you start preparing the slides, such illustrations become very useful and will make your job much easier.

3.1.2. Economic Segment

The economic segment of a general environment of an industry includes various factors that can affect the economic and financial condition of the various companies and businesses operating in that industry. Major economic factors include various elements such as interest rates, gross domestic products, inflation rates, level of disposable income, unemployment rates, exchange rate and general growth and decline of the economy.

The economic situation is effective enough because the interest rate in the U.S. economy is at its low. Despite the recent decrease in the prices of various energy related commodities, the inflation rate in the economy is also low, which was recorded at 0.80 in December 2014. The investment opportunities are high and both the cost of capital and cost of debt are low, which will automatically increase the chances of employment in the industry (Fernald & Jones, 2014).



Commented [FE3]: How about the future? The focus should be on the future rather than the status quo.

Due to these factors, the level of disposable income and the consumption power of the people have been reported with certain high values. Both of which are the most influential economic factors for the growth of the energy (Fernald & Jones, 2014). Within the last decade unemployment rates have been of great concerns in the U.S. economy. In October of 2009 unemployment rates reached 10.2% in a time when people were on constant edge of losing their jobs, conserving money, and consumers and major companies cutting back on costs and disposable income wherever possible. Today unemployment is just over 5% and as previously indicated the level of disposable income has been increasing in recent times. Even though, the

Financial Forecast Center is predicting unemployment rates to increase slightly in the upcoming months to that of 6.2% by July 2015 (U.S. Financial Forecast Center, 2015), it is not believed that this slight increase will drastically effect the disposable income or the investing opportunities of companies within the energy industry.



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3.1.3. Political/Legal Segment

The Political and Legal factors that have impacted the energy production industry have been an across the board intervention since the energy market began in the 1930s. In the last 80 plus years the American government has passed numerous laws and executive actions to limit imports of the natural resources required to create energy, manage prices and regulate gas and electric utilities themselves. This was done with the active participation of the energy industry to resolve what was considered as issues in the energy market at a particular point in time. However, it was not until after the first 40 years of this activity, during the Middle Eastern Oil stoppage that American policymakers realized that the federal government's involvement in the energy industry was in fact failing. It was seen that the majority of the federal regulations in the industry were destabilizing the market, decreasing consumer welfare, and reducing the domestic output. To correct these failures, significant steps were taken during the 1970s and 1980s to deregulate and free the energy markets which ultimately benefited the overall economy and the consumer. One of these laws that were instituted during this period was The National Industrial Recovery Act of 1933 (NIRA). This particular Act backed by oil companies, replaced producer agreements for normal market competition. However, the Supreme Court ruled NIRA unconstitutional a year later, in 1934.

Another law that was implemented was The Energy Supply and Environmental Coordination Act of 1974 which directed the Federal Energy Administration to restrict the use of oil or natural gas

by electric utility company and instead to use coal to generate energy in electric power plants. This was due in part to the previously mentioned Middle Eastern Oil Crisis. Under the Department of Energy Organization Act in 1977 and the Natural Gas Policy Act in 1978, the Federal Power Commission was replaced with FERC and natural gas pricing controls were put into place which later required additional legislation in the 1980s to completely deregulate wellhead prices from the 1938 The Natural Gas Act (Doren, 2009).

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Today there are executive orders that have recently been put into place to assist in the labor crisis that the energy industry is currently facing. An Executive Order on Industrial Energy Efficiency was signed to facilitate the investment in the energy industry's efficiency that will strengthen manufacturing and create jobs. This executive order aims to increase American power capacity fifty percent by the year 2020.

A Stimulus Program that will and has drastically changed the energy industry is the Smart Grid Program. In this program industries will be developing, implementing, and putting into operation an integrated communication system that will ultimately link together, utilities, appliance companies, telecommunications industry, renewable energy companies, energy storage companies and more. Over 50 million smart meters linked to the Smart Grid were installed between 2010 and 2012 totaling an investment of more than \$4.5 million in the modernizing of the U.S. energy industry. Another modern day law that has impacted the energy industry is part of the Energy Policy Act of 2005, the Department of Energy's Loan Guarantee Program. This particular program provides Federal support for innovative technologies to initiate the investment of clean energy projects. A 2009 Amendment extended the program by allowing guaranteed loans for renewable energy systems, electric transmission systems, and leading edge bio-fuels projects (The Energy Industry in the United States).

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Commented [FE6]: Please end with a picture of the future regulations related to this industry.

3.1.4. Socio-Cultural Segment

Socio-Cultural Segment includes cultural norms and values of a given population, their attitudes toward that industry, how it impacts their lifestyles, changes in that industries workforce and even changes in how a culture uses or consumes the product manufactured by the industry.

Today we use every invention and method of energy that has been discovered in almost every manner of how we live our day to day lives. Less than 110 years ago people were still washing clothes on a wash board. Today, we have High Energy efficient washing machines that utilize the minimal amount of water required to effectively clean your clothes. Without electricity we would not be able to watch all those popular reality shows on television, listen to the radio in your car, text on a cell phone. Electricity has changed how people eat, as people are now able to preserve and reheat food that was prepared two days ago. It has changed the manner in which people heat their homes and even how people maintain their homes and yards. Before gas powered lawnmowers, grass was cut by a rotary reel push lawn mower which was done by sharp steel blades. As you can see electricity has drastically changed cultural norms and values in the last hundred years and it is changing faster and more in the last decade. Electricity has made it possible for a woman in Ireland to post on a social networking site the confrontation at a wedding surrounding the color of her dress and spread to all corners of the world making it the most talked about topic. Professionals can hold conference meeting via Skype with business on another continent, military service members can communicate with their families via Vonage.

The workforce composition is another contributing factor in the influence of the Socio-Cultural Segment of this industry. The American workforce is in fact aging and as more employees reach the age of retirement with them goes the knowledge and experience that they have acquired through their years of work. The U.S. Department of Energy believes that this transition will be

Commented [FE7]: This is unnecessary and irrelevant. The question is NOT "how has electricity changed the sociocultural environment". The question is "what sociocultural changes are going to affect this industry".

Commented [FE8]: Aging is a demographic factor.

especially challenging for the electric utilities industry as the quality, reliability and service are all dependent on an effective, knowledgeable, and efficient workforce. (U.S. Department of Energy, 2006). Even though the overall cost of labor is less than half of the cost of production, without a workforce there will be no one to run or monitor the equipment necessary to produce product.

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Supplying enough electricity for the consumption of the ever improving and trending cultural norms and values of the consumer will be a notable opportunity, threat, and driving forces the energy industry. Maintaining an effective and competent workforce composition will be another challenge in this industry.

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3.1.5 Technological Segment

Technology is a competitive factor that allows companies to stay ahead in their industry. It is in a constant state of growth and development, and the benefits it provides are essential to making tasks run more efficiently. The factors that constitute this segment include the pace of change, technical developments, investments in R&D projects, and system automation. The technological factors that are most relevant to the electric industry are developments from research and the other technical developments that provide a steady source for electricity while maintaining safety.

One kind of technology being used in Kansai Electric Power is the enhancement of the heat pump technology which employs a process of chemical absorption to separate and recover the CO₂ from exhaust gases resulting from thermal power generation (MarketLine 2013). The advanced heat pump technology creates for new distinctive energy solutions of what could be offered to the consumer.

When presented with the innovation challenge to reduce the cost of energy storage options and develop integrated value proposition, the industry created the technology of a battery, ultra-capacitor and compressed air energy storage systems. The other technologies that have been developed to help generate electricity are microgrids and turbines. M.R. Jablonska recently stated in a review that for citizens, microgrids allow for an availability of possessing complete price information in real-time and gaining new possibilities of making choices in their energy consumption (Jablonska, 2014). Microgrids make it possible for make a grid more stability and efficiency. Turbines on the other hand have increased the use of wind power for U.S. electric generating capacity by 32 percent. This technology has seen mass success in the industry due to its assembly capability of more than 5 GW (Congressional Digest 2013).

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Commented [FE10]: You don't need to explain these technologies. Just name them and categorize them as process innovations, because they tend to improve the production process.

3.1.6. Physical Segment ✨

The physical segment of the general environment of a particular industry is concerned with the impacts of its operations and existence on the physical environment of the world. The physical environment is referred to as the changes resulted in the physical environment and the industry practices and are intended to deal and respond to those changes in a positive manner. The elements of the physical environment include energy consumption, renewable energy resources, methods used to develop various energy sources, reducing the impact of the industry on the environment, availability of natural resources such as water and air, pollution rate, and the level of energy consumption and reserves. The availability of natural resources is essential to the industry as energy is influence by nature in many ways. Due to this, the company should be established in a well located place that will enable it to influence change in its energy production (Hung, 2010).

Commented [FE11]: Are there any other innovations worth mentioning?
How about competing technologies?
What if in 10 years all cars are electric cars?
What if solar power catches on and gas-fueled plants become redundant?
You need to do your research thoroughly. Put yourselves in the shoes of the managers and think what threatens your business and what fosters it.

The overall energy consumption of the U.S. for the production of retail and industrial items is high, making it the 7th largest energy consumer per capita. Various energy resources that are commonly used in the United States include fossil fuel, natural gas, oil, petroleum, geothermal, solar energy, nuclear power and other sources of renewable energy. An analysis of the last five decades showed that the consumption of energy has been increased in the U.S. as compared to its production capabilities (Payne, 2012). This factor can greatly influence the industry of geothermal energy in a positive way because the demand for renewable energy is growing rapidly. Currently, in the U.S., the available renewable energy resources include biomass, hydroelectric dams, solar energy, geothermal and wind power. The renewable energy (geothermal energy industry) is contributing about 8% to the overall energy supply, which means the industry is currently in its growth phase. Various methods are used for the generation of energy sources; however, the advancement of technology has improved the production due to continuous innovation and the development of new equipment. The natural gas fueled power producer industry is well established and is one of the active contributors of the energy industry in the U.S. Geothermal energy is frequently available because it takes less time in replenishing as compared to natural gas and other renewable resources and is minimal in terms of greenhouse gases. However, it has some other environmental impacts such as acid rain production, ecosystem destruction, ozone depletion and carcinogen release. The impact of natural gas fueled power production on the environment is a little high because the natural gas itself is a potential greenhouse gas, which is believed to be a contributor of global warming. On the other hand, the use of natural gas can fix several environmental issues such as smog formation (Payne, 2012). The level of energy consumption in the U.S. is high and it is mostly dependent upon non-renewable energy sources such as fossil fuel, natural gas, petroleum and nuclear energy. As

re-
lated

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Commented [FE14]: How did you make this conclusion?

Commented [FE13]: Focusing on renewable sources may not be the best approach given your topic (Physical Environment). Here you should discuss the scarce natural resources; not renewable resources.

Commented [FE12]: I see why total demand may be increasing, but I don't understand why you attribute it all to geothermal productions. Please be logical.

compared to the reserves of the energy resources, the consumption is very high and if it continues growing with the same rate in the future, the reserves will soon reach an end. The new energy sources, especially renewable energy reserves are higher than its consumption and its impact on the environment is also low, which can create opportunities in the future. The general physical environment has been polluted due to various non-renewable energy resources, however; the use of natural gas and geothermal energy resources for power production can help in minimizing the pollution (Hung, 2010).

related

Commented [FE16]: So what do you make of all this? It will hugely enhance your report if you end with a paragraph that touches on the main discussion points. Always remember the objective of this part of the report: to draw a picture of the future and to interpret what that future means for this industry.

3.1.7. Driving Forces

The most influential factor impacting the overall general environmental segments of the energy industry is the American government. The laws, regulations, and decisions that policymakers create influence almost every area of the industry as they create a chain reaction which creates several other influential sub-factors.

These laws largely impact the overall health and sustainability of the U.S. economy which in turn has a huge impact on any and every industry. As described in the Economic Segment the most influential factors for the energy industry are the levels of disposable income, GDP, unemployment rates, and the costs of capital and inflation. Laws put into place to completely stop imports, raise taxes, fail to adequately provide jobs or training for jobs greatly influence this segment as well. High unemployment rates can limit disposable income and the consumption power of the people which in turn can significantly impact the nation's GDP.

As stated in the Political and Legal Segment Political factors heavily influenced the energy industry and it was later discovered that the many federal regulations that were imposed on the industry were actually decreasing consumer welfare, destabilizing the market, and reducing the domestic output. However, today the main focus is not only to boost the economy by creating

jobs and training for these jobs but to also aide in the technological advances of the efficiency of the energy industry which is done by the American government.

Stimulus programs have been put into place to fund such things that one would find the Technological Segment like the Smart Grid system. This is a huge factor that influences the industry as it improves its overall operation acting as an integrated communication system that links together the majority of the areas of the energy industry. Policymakers have also instituted a program that will supply funds to companies that are looking to invest in the clean and renewable energy projects. This is being seen in the types of automobiles we drive, such as plug-in electric vehicles, the way in which energy is produced, such as increasing the load capacity of generators and turbines without building large power plants. It has also been seen in recent developments in the enhancements of energy storage and in the processes in which power is generated from improvements in how heat pumps are used. As you can the American government is largely a factor impacting many other factors influencing the overall general environment analysis of the energy industry.

3.2. Industry Analysis

Calpine is a wholesale power producer that is in the business of generating electricity. This business is characterized by fierce competition that management must understand for them to be able to correctly assess and make predictions about the nature of their business. The industry analysis section examines the scope of the electricity industry and those competitive factors that influences it.

The areas to be covered will be a general description of the electricity industry, the economic features that dominate it, the size of the market and potential growth factors, and the past and future trends. Porters five competitive forces that attract the competitive nature of this industry

⇒ Pin Point the laws for the

Commented [FE17]: So just the laws? Are there any other driving forces besides the regulations?

driving forces

will also be addressed in this section. The five force analysis will include threats of new entrants, the effects and power of substitute products on the industry, the competitive and influential forces of buyers and sellers, and the intensity of rival firms in the industry.

3.2.1. Description of the Industry

The business of generating electricity is the primary focus of this section. Companies in this industry use coal, natural gas, nuclear power, hydro power, and other forms of renewable energy such as solar, geothermal, biomass, wind, petroleum, and other forms of gas to generate electricity. The primary product involves creating electricity and natural gas and marketing to retail service providers. The demand for natural gas can be classified into the following sectors – industrial, residential, commercial, and electric power generation. According to the U.S Energy Information Administration (2014), “Petroleum (oil) is the largest share of U.S. primary energy consumption, followed by natural gas, coal, nuclear electric power, and renewable energy (including hydropower, wood, biofuels, biomass waste, wind, geothermal, and solar). Electricity is a secondary energy source that is generated from primary forms of energy”. These demands are reciprocated by producing most of the natural gas and electricity here in the U.S. thanks largely to progress in technology. Natural gas accounts for 25 British thermal units (Btu), the acceptable unit of measure in the U.S. to compare the different energy usage. Despite providing most of its needs, there is still more to be done. This is according to the Utilities Industry Handbook, “The Energy Information Administration projects that 355 gigawatts of new electric generating capacity - or more than 40% more than the industry currently supplies - will be needed by 2020 to meet growing demand” (Investopedia Staff, Dec. 15, 2015). Meanwhile, providing an efficient, reliable and affordable supply of clean natural gas and electricity requires firms in this industry to be cost effective and be able to provide value for its customers and other

through

Commented [FE18]: They don't produce natural gas. They use it as an input.

Commented [FE19]: This is wrong! This industry doesn't produce natural gas.

Similarly, any discussion of natural gas as a product of this industry should be removed from your report, Calpine and its competitors do not produce and sell natural gas.

⇒ related

activities that relates to it. Amidst very rigorous and strict legal and environmental regulations, achieving the concept of value chain remains to be a challenge.

3.2.2. Industry Dominant Economic Features ✖

The industry dominant economic features include those features that can explain the competitive environment of a particular industry for the companies operating in it. These features help in understanding the landscape of an industry. Various industry dominant economic features include market size, growth rate, buyer needs, point of product differentiation, pace of technology, product innovation, point of vertical/horizontal integration, economies of scales, ease of entry/exit, capacity utilization, impact of experience and industry profitability (Ladomerský, Balog & Martinka, 2014).

The overall market share of the energy industry is 85MW of the 540MW global industry, which is growing steadily and the increasing demand of the energy will further improve its growth in the future. The demand of customers is increasing rapidly due to the high need of energy and low availability of replenishing energy generation resources (Ladomerský, Balog & Martinka, 2014). The industry is also open to technological changes and product innovations, which can affect the growth and performance of the industry. Another economic factor is that due to the high startup costs, the entry and exit barriers are quite high in these industries because of the difficulty in getting the same value at the time of exit that they had at startup. The impact of having individual expertise is higher on the productivity of the industry because experienced producers can find better ways to get economies of scale and they can build strong relationships with their customers. The profitability in this industry is high and is expected to increase in the next few years (Ladomerský, Balog & Martinka, 2014).

Commented [FE20]: Market size (not market share) is measured in dollars.

Commented [FE21]: Please provide a graph for demand changes.

Commented [FE22]: What are these costs?

Such as:

Commented [FE23]: Compare the ROA in this industry with some other industries. You can't just make such a statement without providing data that support it.

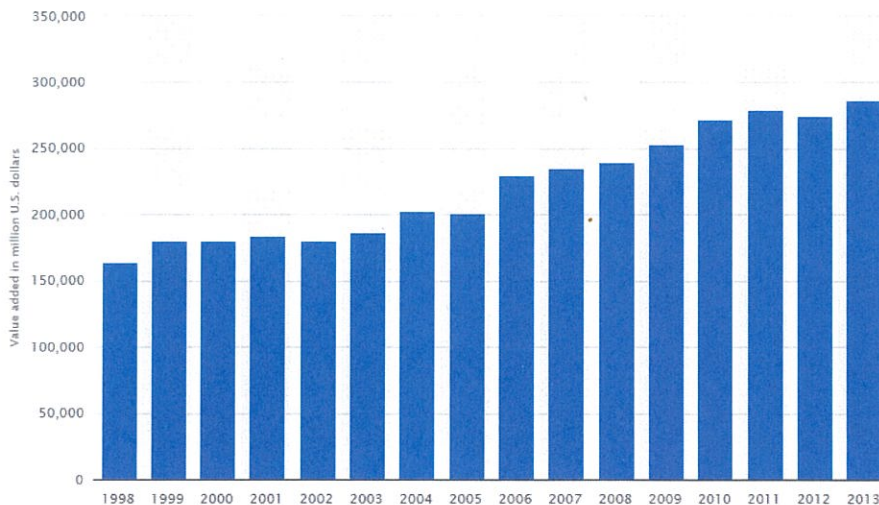
3.2.3. Market Size and Growth

The energy industry is the third largest industry in the United States producing oils, natural gas, coal, nuclear power, renewable energy and fuels in addition to electricity. The increasing demand from consumers in addition to the aggressive workforce and supply chain that are capable of creating all energy technologies have not only made the United States one of the world's largest consumers but a leader in the production and supply of energy. As of 2014, the United States holds the most attractive piece of a \$6 trillion global energy market.

As shown in the figure below the value that the United States utility sector adds to the U.S. GDP has grown considerably since 1998. Within the last two decades the added value to the U.S. GDP has increased approximately \$124 billion. This statistic is calculated by determining the difference between the industries' gross output and the cost of the intermediate inputs (Statista, 2013).

⇒ related
write on index
cards

Total U.S. electricity net generation from 1950 to 2013 (in billion kilowatt hours)*



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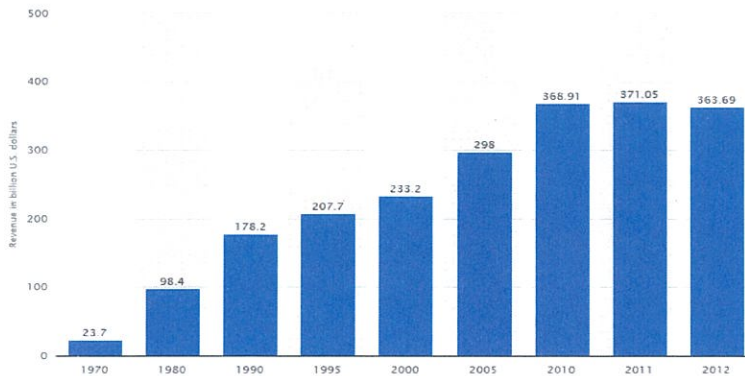
With the world's population expected to reach 9.4 billion in the next thirty years, according to estimates from the U.S. Department of Energy, the demand of energy is predicted to more than

double in coming years. There have been growing concerns that have become more and more apparent in the past several years over climate changes and this has caused many companies in the industry looking at improvements in the renewable energy area. The IEA's 2012 World Energy Outlook report predicts that between 2012 and 2035, 278 billion US dollars will be spent on just this. The report also expects the electricity that is generated from this investment in environmentally-friendly sources will increase three times its current rate (Galas, 2014).

A historic trend of revenue in the electricity industry in the United States between 1970 and 2012 is shown below. This graph shows a significant increase in revenues from 23.7 billion in 1970 to 364 billion in 2012 (Statista, 2013). However, as you can also see from the graph below, the revenue has held somewhat stagnant in the past five years. Some market researchers believe this slow growth rate is due to the unstable economy that caused many industries to lower their prices. It is believed though, as previously stated with the investments in renewable energy that the electricity industry's revenues will increase at a stable rate in the upcoming years as the economy recovers.

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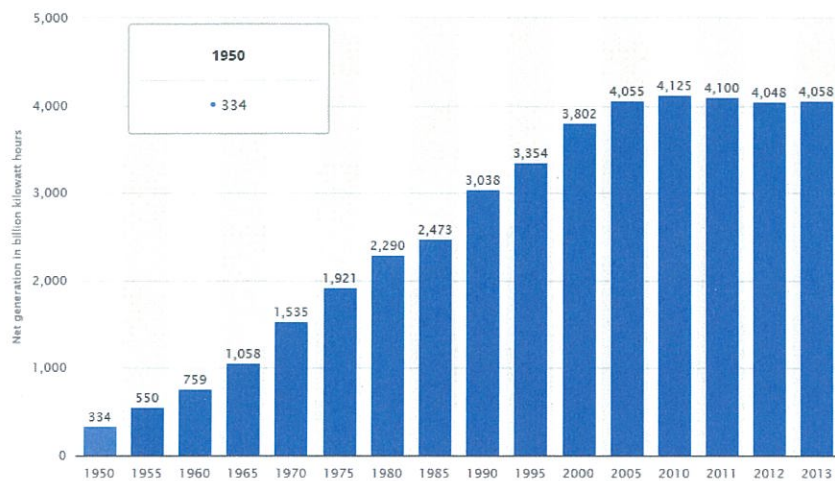
Value added of the U.S. utility sector 2013



The growth rate of electricity generated in the last 60 years is shown below. In 1950, only 334 billion kilowatt hours of electricity was generated. Today that number has increased more than twelve times at a rate of 4,058 billion kilowatt hours of generated electricity.

⇒ related

Electricity generation by electric utilities in the U.S. from 2000 to 2013 (in million megawatt hours)



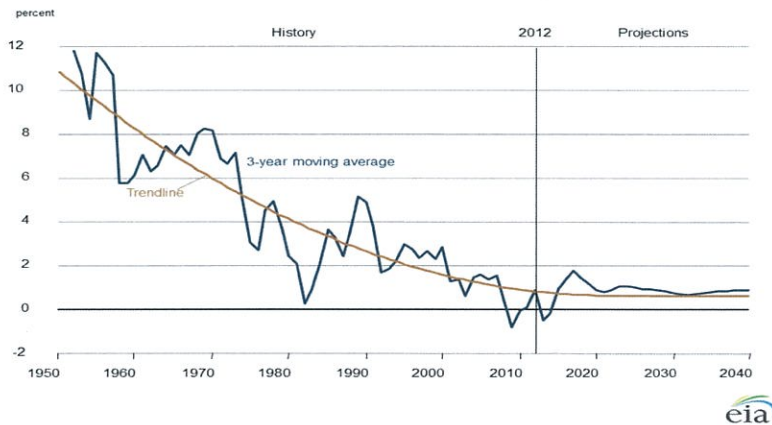
Since 2005 the United States has generated more than four thousand kilowatt hours of electricity.

According 2012 statistics those four thousand kilowatt hours come from coal, natural gas electricity, nuclear power, renewable energy, and electricity from petroleum and gases. This generated electricity is manufactured by investor-owned electric and municipal utilities, federal agencies, utility co-operatives, and renewable sources (Statista, 2013).

Even though the revenues and the amount of electricity generated have significantly increased in the last several decades, and regardless of the fact that the US holds the most attractive piece in the global energy industry, the demand for electricity has been slowing down for some time. As seen from the demand graph below, the demand for electricity has declined from 9.8% per year in 1960 to 0.9% per year in 2012. The U.S. Energy Information Administration believes that this

low demand is “offset by efficiency gains from new appliance standards and investments in energy-efficient equipment.” In reference case, AEO2014, performed by the Administration it was also found that Sales in electricity are expected to grow by 2040 in the customer areas of Retail, Residential, Commercial, and Industrial anywhere between 25% and 30%. That is an increase from 3,686 kilowatts per hour in 2012 to 4,623 kilowatts per hour in 2040.

Figure MT-29. U.S. electricity demand growth in the Reference case, 1950-2040



The U.S. Energy Information Administration further states that the demand for electricity is going to vary as technology in energy-efficiency and prices improve. Assuming there is a high economic growth, they assume that the electricity demand will increase by approximately 40% instead of the 20% stated above which is based off of a low economic growth (U.S. Energy Information Administration, 2014).

3.2.4. Industry Trends

The largest contributing factor to the Industry's trend is new technology. Technology is such a broad term and can range from Information Technology to updated equipment technology such as that used in the actual production of electricity. Both are important here in the Industry Trend as businesses in this industry use them to find new ways to cut costs, increase efficiencies and improve their competitive advantage. As previously mentioned there has been an enhancement of heat pumps that ultimately creates a distinctive energy solution in addition to new innovative development in energy storage systems that have led to a boost in customer offerings and satisfaction. More than sixty years ago when the first Nuclear Reactor was put into service, it was not thought that Information Technology would have such a big impact on the Energy Industry. Things like social media which only became popular in the last decade have become mandatory for any industry. In 2013, Gartner, Inc. published the top ten technology trends that they believe are affecting the global electricity and energy markets. In that publication the top setting trend was the ability of the Utility Sectors IT leaders to utilize social media in different areas of business such as customer acquisition and a station to initiate customer participation in energy efficient programs. Communications on outages being reported through Social media is also on the rise and an important factor and value for the utility and energy markets. The use of social media improving internal utility business process is also starting to develop.

For years, utility companies have line-workers go out into the field to gather that data and information that is necessary to provide electricity to their customers. These employees have such tasks as reading meters, searching out and repairing broken equipment and measuring voltage as the majority of these devices are not automated. However, today technology allows utility companies the options of modernizing these devices in usage with the "grid". This smart

Commented [FE25]: How is social media used in the business of generating electricity in natural-gas-fueled power plants?

Commented [FE26]: Power generators (like Calpine) sell to retailers (Like Reliant) not to customers (like you and me). So they don't acquire/retain their customers via social media, as their customers are businesses.

grid comprises of wires, switches, transformers, substations and more that transport electricity from the manufacturing plants to its consumers. This system made possible by computer processing from two-way communication technology, is now being used in the electricity industry where improvements in energy efficiency on the grid itself and in consumer usage is being seen (U.S. Department of Energy, 2014). The continued development of the Smart grid technology will improve "data quantity by several orders of magnitude, driven by a host of edge devices, as well as new IT and OT applications such as advanced metering infrastructure (AMI), synchrophasors, smart appliances, micro-grids, advanced distribution management, remote asset monitoring, event avoidance and self-healing networks. In addition to significantly impacting data volume, smart grid initiatives will produce a different variety of data, such as temporal, spatial, transactional, streaming, structured and unstructured" (Moore, 2013). The main support system for the improvement in data quantity is the AMI which provides low-latency data that will pinpoint asset utilization failure detection and assist in the presence of the consumer in the energy market.

Another big contributor to the Industry trends is Renewable Energy Integration. This plan "focuses on incorporating renewable energy, distributed generation, energy storage, thermally activated technologies, and demand response into the electric distribution and transmission system". With a big focus on the environmental impact of any manufacturing industry to goal of Renewable energy is to improve the design, planning of, and the operation of the electric grid. In order for this to be successful the grid must reduce carbon emissions and air pollutants by increasing the usage of the renewable energy, increase asset productivity to ultimately lower the costs of electricity, improve the dependability, efficiency, elasticity, and security of "micro-grid" applications in infrastructure protection and highly constrained areas of the electric grid", in

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addition to even reducing the consumption of oil by “enabling plug-in vehicle operations with the grid” (U.S. Department of Energy, 2014). As you can see the electric company goes far beyond just power homes and manufacturing facilities but new technology in this industry has even filtered into the automobile industry by the powering of plug-in electric vehicles.

In the other arena of technological advances, the energy industry no longer has the need to build large and expensive power plants when increased capacity is required as the economies of scale argument is no longer feasible. Today smaller generators, micro and mini turbines, reciprocating engines, fuel cells, and photovoltaics are several technologies that can be added in the energy manufacturing process to add to the load capacity (Battles, 1999). Since the manufacturing of electricity involves the generation of electrical power using these rotating turbines that are attached the electrical generators one can only imagine how this has changed since its invention and how it has changed the industry. Turbines are powered by fluid like steam, water, wind, and hot gases that acts like an “intermediate energy carrier”. Natural resources like coal, natural gas and petroleum are used to heat these fluids that in turn create the electricity. Newer technology allows the use of the sun as a heat source which is later used to produce steam that boils the fluid, like water which powers the turbine to create electricity. Wind is artificially produced in solar updraft towers which are also heated up by sunlight. Newer technologies that are still being established and investigated are solid state generation. This area is of great interest as these devices lack the moving parts and are controlled by thermoelectric devices, though thermionic, and thermophotovoltaic systems (Electricity Forum, 2015).

3.2.5. Five Forces Analysis

Porter’s five forces model is a framework designed to analyze the degree of competition in the industry for building strategies and identifying various threats and opportunities. The five forces

⇒ research

Commented [FE27]: It might be useful for your project to make an estimation about demand for electric power, depending on the sales of electric cars. How much kWh per year may that be if X percent of cars are electric cars. What that X percent is going to be in 10 years?

model is comprised of the buyer's bargaining power, supplier bargaining power, threat of substitute, threat of new entry and industry rivalry. The level of each component of the model shows the attractiveness and the unattractiveness of an industry.

Porter's five forces assist in analyzing the micro environment of an industry that is closely related to the companies that are operating in an industry. For developing a strategy, a firm needs to analyze its micro environment because the attractiveness of the macro environment cannot determine the profitability of the company over its investment. The Five Competitive Forces are typically described as follows:



3.2.5.1 Threat of New Entrants

The threat of new entrants creates new factors that impose competitive pressure on companies already in the marketplace. The size of the pool of likely new entrants determines the strength of the threat. One of the major underlying factors of entrant threats is the existing industry members looking to enter a new market segment where they currently do not have a presence. Another underlying factor refers to whether new entrants face a high entry barrier or low entry

barrier. High barriers mean that existing companies lower the possible threat they may face from the new entrants, whereas low barriers refer to a company's inability to reduce the threat of intended new entrants.

Industry trends and regulatory initiatives provided opportunities for independent wholesale power producers to compete to provide electric power, having more providers enter the market as a result (MarketLine 2014). The three largest markets for this industry are California, Texas, and the Mid-Atlantic region. Other major threats to the industry are companies who service renewable energy, granting a trendy alternative to energy consumers.

3.2.5.2. Power of Substitute Products *

The threat of substitutes for the geothermal energy industry and natural gas fueled power producer is high because there are a number of other sources available in the world for the generation of electricity based energy. The key substitute products include solar energy, wind energy, hydroelectric energy, biomass energy, hydrogen energy, ocean energy, petroleum energy, nuclear energy and fossil fuel energy. These sources of energy are effective due to their low costs and use in only some areas. However, the increasing concerns of the environmental hazards due to the use of various non-renewable natural resources for energy generation have increased the attractiveness of renewable energy sources. Moreover, the geothermal energy industry is currently new therefore it will take some time to reduce the impact of substitutes (Fernald, & Jones, 2014).

3.2.5.3. Power of Buyers *

The power of Buyers is defined just as it insinuates, it is the overall impact that customers and/or consumers have on the production a company or industry. Defining who those buyers are is

Commented [FE28]: I see no application of the underlying factors for this force. There is a list in the textbook that you should use. Not anything else. Please stick to the list and make sure you cover a few of them. I appreciate you using external sources about the new actual entrants into the industry, but when we discuss new entrants, we mean hypothetical future competitors. This force just measures how difficult it is to start a business in this industry. The factors that contribute to the strength of this force are therefore addressing those barriers to entry. Please make sure you read the description of each section and follow it.

Commented [FE29]: Please see my comment on your draft. Electricity produced from nuclear, solar, or other sources is no different from that produced in natural gas-fueled plants. Substitutes products/services cannot be identical to the industry's products.

What can you substitute for the electricity you buy?

- You can use natural gas for heat (reduces your electric costs).
- You may setup a solar cell on your roof and generate your own electricity (this is being done in some regions of the US).
- Others?

Do ~~not~~ research

dependent on the industry itself and the supply chain of the company within that industry. In the electrical producing energy industry those customers are electricity retail companies that then provide electricity to another level of consumers such as individual homes, other business, and manufacturing facilities (Golpe, Carmona & Congregado, 2012).

Commented [FE30]: Good!

Bargaining power of buyers is high due to a set market rate provided by FERC making the ability for competitors using costs leadership difficult. Buyers of electricity can easily find another supplier that produces electricity. The difference is dependent on the raw materials that are used by each individual company to produce electricity which can vary from natural gas, coal, nuclear power etc.

At the same time however, the bargaining power of the buyers in the energy industry is low due to the fact that energy consumption is one of the basic necessities used by every household, business, and other manufacturing plant in the country and in the world. It has become an essential way of life and end use buyers have usually little concern about the impact of the source of energy over the environment because they are only concerned with the ultimate product, i.e. electricity or power generation, which is almost same for each source of the energy production (Golpe, Carmona & Congregado, 2012).

Commented [FE31]: Very good, but please discuss a couple of other factors too.
You have discussed two factors which may be insufficient.

3.2.5.4. Power of Suppliers

The primary suppliers of raw materials are those that supply clean-burning natural gas to generate electricity. Others rely heavily on the heat that comes from the earth's interior for the use of geothermal power to generate electricity. Businesses in this industry also rely on the regular supply of steel. Another set of suppliers are Information Technology (IT) firms because highly trained IT professionals are needed to monitor and control the operating rooms of the

powered plants. Major primary suppliers of specialist equipment are large and highly diversified companies such as Grainger, Tekleen Automatic Filters, Inc., Baker Hughes, Schlumberger, and Smith International are few in number. The demand for their specialized goods and services thus gives them price power. Human resource providers, governments, and landowners are also huge suppliers with substantial dominance in this industry.

The natural gas mix is composed of 45% of ethane and according to Nick Butler's blog of FT.com, "the largest local suppliers are Houston-based American Ethane and Enterprise Product Partners, Royal Dutch Shell and Reliance Industries" (Jan., 2015). Other suppliers in this industry include but not limited to the Indian base conglomerate TATA Group Company which specializes in communications and information technology, engineering materials, energy, services, consumer products and chemicals; BHP Billiton Limited which discovers, acquires, develop, and market natural resources; and ArcelorMittal, a multinational steel producer in Luxemburg also serve as an external supplier to this industry.

The supply of ethane has grown largely in the US thanks to progress in technology which has helped in the processing of extracted natural gas and its related products. Again, Nick Butler reported that "US gas production has risen by over 30 per cent" (Jan., 2015). Essentially, supplier pricing power will be weakened when there is an increase of suppliers.

Ultimately, the first implication of this is that suppliers influence and dominance is reduced due to the excess of natural gas production within the U.S. Another strategy of firms in this industry to reduce pricing power of suppliers will be to create a diverse base of suppliers who create cost-saving equipment and services for daily operations. Another key strategy for businesses in this industry is to keep a balance with suppliers so not to force them out of business by doing a thorough analysis of the pricing trends of all raw materials. In the areas of administrative and

office supplies such as stationaries, there is huge competition among suppliers which limits their bargaining power for businesses in this industry.

3.2.5.5. Intensity of Rivalry

The intensity of rivalry among existing firms in the electricity industry has significant implications on the margin of profits that they generate. Porter in fact ranked this factor as the strongest among the five competitive forces. Some of the factors that determine the strength of rivalry among competitors in this industry are competitor size, similarity of players, undifferentiated products, number of players, easy to expand, high exit barriers, lack of diversity, and the like.

The competitive forces employ different market arsenals to win buyers and earn substantial profits. Since firms in this industry are typically large, each expects to benefit from its large scale of operations which further intensifies the rivalry in the market place. The operations in this industry involve highly skilled laborers making it almost impossible to exit the business since leaving would mean significant divestment of assets. This is another factor that creates more intensity for rivalry. Another reason for the rival intensity is the lack of diversity in the services offered by the entities most of whom are engaged in the same business of generating electricity to their clients. Further structural forces that intensifies rivalry among firms in this industry is the high exit barriers that are associated with government and social restrictions, high fixed costs, and the cost of transforming specialized assets. Firms that feel dissatisfied with their market position in certain areas are sometimes forced to engage in price discounts and use some other desperate strategies like mergers. A case in point is when Calpine Corporation sold its Florida power plant to its rival, Duke Energy.

Ultimately, based on the above factors, the overall intense rivalry among existing firms in the power generating industry can be characterized as moderate. Firms in this industry despite the competition are still able to earn profits that can be regarded as acceptable. Customers in the U.S. must have power in their homes for heating, cooling, and to use their other appliances. This makes it very difficult for them to switch brands as substitutes.

Commented [FE32]: Very well done!

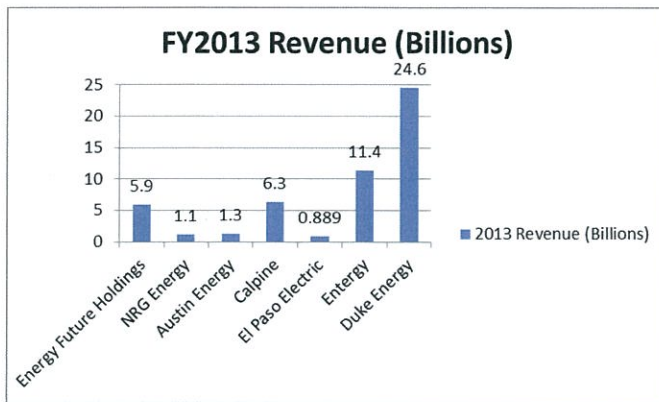
3.3 Competition Analysis

The competition analysis assesses the strengths and weaknesses of the competition in the industry, giving insight on how Calpine Corporation should prepare for advances and react to threats. Analyzing the competitive environment is important in order to create an effective marketing strategy for the company.

3.3.1 Industry Competitors

There are members of the electric power industry that share a similar competitive approach and market position. The factors that distinguish these competitors are the degree of services offered and product-line breadth. Calpine Corporation has a distinctive strategic approach compared to its competitors because it is a company that generates produces, and markets electric power. The competition of Calpine includes the following electric utility companies: Energy Future Holdings, NRG Energy, Austin Energy, El Paso Electric, Entergy, and Duke Energy.

Commented [FE33]: Where did you get this list from? Are these all the competitors?



In addition to having the top revenue earnings, the similarity of location and services provided have narrowed Calpine's three competitors to direct electric companies: Energy Future Holdings, Entergy, and Duke Energy.

Commented [FE34]: Location of the headquarter or the power plants? Either way how much does it matter?

	Calpine Corporation	Energy Future Holdings Corp.	Entergy	Duke Energy
Power Capacity	28,104 Megawatts	18,300 Megawatts	30,000 Megawatts	8,277 Megawatts
Strengths & Services Provided	• Producer of Clean energy • Largest US generator of electricity from natural gas and geothermal resources • natural gas-fired combustion turbines	• Strong market position • Largest in electricity delivery points in TX • majority of the power is generated through coal & nuclear power plants	• Electricity generation, distribution, & retailing • the second-largest nuclear generator • natural gas, nuclear, coal, oil & hydroelectric power	• generates and distributes electricity • Generation comes from coal, natural gas, oil or its nuclear power plants. • Strong vertical integration
Employees	2,157	9,000	14,000	27,948

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Energy Future Holdings Corporation (EFH) is one of the major retail electric providers in Texas.

Based in Dallas, Texas, it provides energy, and conducts and partakes in power distribution operations. It has numerous regulated sub-companies, such as *Luminant*, which is one of the largest power generated electricity providers in Texas. *TXU Energy* is EFH's retail subsidiary that successfully meets consumer needs. The distributor sub-company *Oncor*, is the largest distribution and transmission system in Texas. Calpine lacks a distribution segment of their company which could be seen as a weakness within the company itself or a disadvantage. EFH services to more than 3 million homes and a power capacity of 18 thousand megawatts (MW). Employing over 9,000 workers compared to Calpine's number of employees of just over 2,000, EFH is a major competitive force in the industry (MarketLine 2014).

Another company that shares direct competition to Calpine is Entergy Corporation. Entergy is another electric company that primarily produces its electric power while also running the successful retail distribution operations. After overtaking the Texas electric power company *Gulf State Utilities*, the emergence of a Texas branch location (called Entergy-Texas) allowed the company to broaden its competition to the Texas industry. Earning revenue of \$11.4 billion annually, Entergy owns and operates power plants with an electric generating capacity of roughly 30,000 MW while servicing about 2.8 million customers.

Duke Energy earned an annual revenue amount of \$24.6 billion, the second most by an electric power company for that fiscal year. Much like its previously analyzed competitors, Duke Energy also engages in the generation, transmission, and distribution of electric power. Their regulated utilities division operates six nuclear generating stations that have a combined power

capacity of 8,277 MW. Duke has a strong generation of electric power that evidently boosts its share in the market. The commercial power of Duke Energy is one of its main strengths in the industry. Through many of its other affiliates, Duke is able to develop and operate electric generation for major energy consumers and facilities in the industry (MarketLine 2014). Having a broad customer base reduces Duke Energy's dependence on any one particular group which reduces its business risk, whereas for Calpine, distribution dependency is one its greatest company weaknesses.

Calpine Corporation generates and produces its own power, but does not distribute it. Its direct competitors have this strength over the company which is why their annual revenue earnings are significantly higher. With that said Calpine's strengths are its clean energy production and being the leader of environmental stewardship. Operating largely through geothermal and natural gas power plants gives Calpine Corporation a major competitive standing in the wholesale power market (Calpine Corp., 2011).

3.3.2 Rivals Anticipated Strategic Moves

With Energy Future Holdings undergoing a very recent filing for bankruptcy, the company is currently dealing with the fallout of the future ownership of one of its power plants from its subsidiary company *Luminant*. It is reported that its locally competitive power generator companies such as NRG Energy and Calpine could very well own one of *Luminant's* power plants due to a recent bill filed by the Texas Legislature. Previous Texas legislation limited the electricity market forcing all electric power companies to maintain a twenty percent maximum limit of the market share (Sakelaris, 2015). Though, with the demand for electricity in the U.S. having an expectation to rise by 29% by the year 2040, the anticipated increase in the

commercial and domestic sectors will grant a break for the company to earn a growth in its revenues and market share.

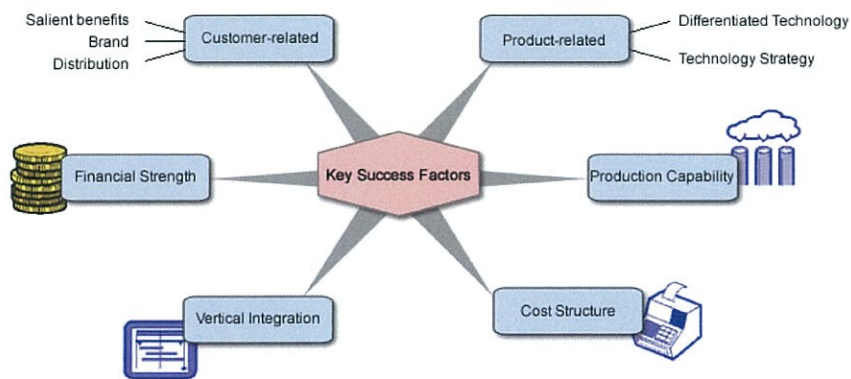
Entergy, however, is looking to expand more in Louisiana. Entergy Gulf States Louisiana revealed its plan to construct a nearly \$200 million transmission project in the Lake Charles area. The project's purpose is to prepare its grid for the expected rise in the demand for electricity amidst the region's industrial boom. Entergy prepares to make it one of the largest transmission projects ever done, and predicts it to be ready for use by 2018 (Larino, 2015). To keep up with their competitor's pace, Calpine also plans to expand. Calpine is developing its own projects to grow its generation capacity. There is currently a 699 MW of capacity being assembled, which includes the expansion centers in Texas and other areas. With the types of deregulations of the power industry over the past decade, more wholesale providers have entered the market which essentially increases the competition against the dominance of Calpine Corporation. To maintain its industry standing, Calpine consistently looks for opportunities to expand.

Duke Energy is developing a new wind farm in South Texas that is expected to generate 200 MW of renewable power for Austin Energy, a Texas-based electric utility company that has about one million people in its service territory (Chapa, 2014). This business move to further generate and distribute power is not new to the local area. The project will cost roughly \$1 million and allows Duke to strengthen its competitive stake in the business of providing energy, and cement its dominant standing in Texas. Both Duke and Calpine understand that renewable energy is the industry trend and their recent project developments are their plans to capitalize from it.

Commented [FE35]: Very good job!

3.3.3. Key Success Factors

Gamble, Peteraf, & Thompson Jr. (2012) defined Key Success Factors “as the strategy elements, product attributes, competitive capabilities, or intangible assets with the greatest impact on future success in the market place” (p. 62). In other words, businesses have to identify what it takes for them to succeed in the marketplace. It should serve as a guide to concentrate on those specific activities in which they are very good at instead of trying to be good at too many things that does not really matter. In the power generating industry, the major power attributes, resources and/or capabilities that are essential for success will include technological innovation, meeting production capabilities, and controlling costs. This is summarized in the chart below:



Commented [FE36]: What does “meeting production capability” mean? Do you mean high “production capacity”, “efficient production”, “full utilization of existing production capacity”?

Please be specific. Also, I don't see an explanation of this factor in the following paragraphs. Please use each paragraph to discuss one factor.

Commented [FE37]: The chart has six factors, you listed three.

Source: Green Rhino Energy: http://www.greenrhinoenergy.com/solar/industry/ind_ksfs.php

Succeeding in the power generating market place requires investing in innovative technology.

This is because the technologies of today can easily be obsolete tomorrow which reinforces the idea for firms to continuously invest in technologies that will enhance clean and environmentally friendly power supplies. The increased pressure to develop renewable energy technology is also a good reason for businesses in this industry to invest in technology. Companies that develop

Related

technologies that address the impact of global warming and the depletion of fossil fuels will generate a competitive edge in the long run.

Investing in research and developments will enhance production capabilities are readily in place for unexpected increases in demand. It also means that business will be more efficient in what they do. Accessing distribution channels, creating brand strengths and communicating to customers should is also a competitive factor that firms should possess. Controlling costs should be a key concept for prospering in the market place. Firms must ensure they create initiatives that launch crusades on waste if they are to maintain and improve upon their profits. Finally, to finance growth, it is essential that firms maintain a strong financial statement.

Ultimately, managers in the power generating industry need to concentrate their efforts on the critical factors that are important to the firm's long-term competitive success. This means that factors that will not put the business in a less competitive advantage should not be in their list. It is therefore important that each manager should be sure that they are aware of the key success factors in their business.

3.4. Summary of Opportunities and Threats

Calpine, an independent electricity producer, is a leader in providing reliable energy source to consumers in North America. This creates many opportunities for the company in this booming industry. As discussed above the U.S. and world population is growing and is expected to continue to increase in the upcoming years. This in addition to the increase in demand that it brings with it provides an incredible opportunity for Calpine to capitalize on. The demand increases mean an increase in supply and production. Increasing production brings up opportunities in investments to expand power plants in addition to investments in R&D projects

Commented [FE38]: Why is it particularly important in "this industry" to control costs? Of course all companies in all industries benefit from controlling cost. There should be a special reason why this is a KSF in this industry.

Commented [FE39]: This is true for all industries. Please remove or explain why this industry requires strong financial statements more so than other industries.

Commented [FE40]: This is a general statement. Please remove this paragraph as it does not add any value to your report.

such as the Department of Energy's Loan Guarantee Program which is guaranteed for innovations technologies for renewable energy production such as geothermal energy. However, the competitive market and nature of the energy business also creates threats to any company trying to maintain a competitive edge in the market. Some of these threats come in a domestic form which regulates all laws, and that is the American government. There are numerous government and environmental regulations that Calpine is subject to. These laws and regulations can drastically change how the energy industry maintains its business and has the immediate potential to negatively affect a business. Another threat is the competitive nature of the energy business. Even though it maintains high barriers, deregulations have made it possible for more providers to enter the market and thus create a threat to the market share of the energy industry.

Commented [FE41]: Please use bullet points and put each point under either the opportunities or the threats.