

A Discussion of the Utilities Industry and its Planning Process

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History

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1990, Public Utilities Commission

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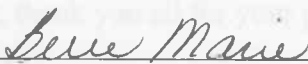
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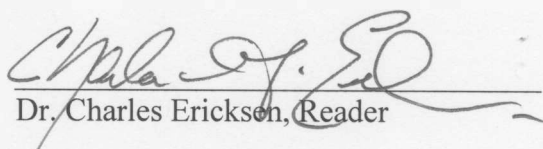
April 2, 2007


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Submitted in partial fulfillment of the requirements for graduation with honors to the Department of Business, Accounting, and Economics at Carroll College, in Helena, Montana.

  
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## **Thesis Statement**

Simply thorough reading the headlines of any major newspaper, it becomes clear that energy is constantly on the minds of the American people. The story may have to do with a regulation barrier that the utility industry is battling, or predictions in the rise or fall of current rates. Given the large amount of money each American spends monthly on a utility bill (about 7 percent of his/her income for the average American and rising each year), and looming threats of energy shortages in each direction we turn, people are finally starting to take a greater interest in their utility companies (BLS.gov: Reflections).

Through the years, utilities have to come to provide services that are not merely desired, but rather expected. The reliance on these amenities can be witnessed in their absence. The death tolls rise whenever an unexpected blackout occurs with elderly people dying in the absence of heat or air conditioning, or traffic fatalities rising because of a traffic signal that's unable to function without electricity. Businesses find themselves losing revenues without the abilities of computers or cordless phones to function. Households feel the pain in the form of losing a hot shower, one's reading light, or the contents of a refrigerator going to waste. The phone lines are soon flooded with thousands of angry customers stating how "ridiculous" and "unacceptable" it is to have temporarily lost power. Although the benefits provided by a modern utility company are still relatively recent, in the consumer's mind, they have become absolutely essential.

This thesis intends to discuss some of the most important aspects that are current in the utilities industry. Through some discussion on the important issues that many people may hear about in the news today, and a large emphasis on the planning process

being used to ensure energy's existence for tomorrow, this thesis intends to answer some of the gray areas in many American citizens' minds regarding the industry. The following sections will lead to a better understanding and appreciation of electricity, a great privilege, which has now seemingly become a right.

While the technology of electricity for appliances and heating became more first discovered about 200 years ago, the widespread use of power did not become common until starting in the 1920s. Of course, this technology was first available to those who lived in areas with many farms that could benefit greatly with (Horsepower) (Horsepower). In the infancy, electricity was very expensive as it took a long time to install and to maintain. However, as time passed, the technology was refined and the cost of electricity was reduced. This was due to the fact that the technology was refined and the cost of electricity was reduced.

With its applications being so vast, it's surprising that it's possible to find so many things for which it's not used. There are in fact many things for which it's not used. One of the most common uses of electricity is for heating. As with any new technology, at first the technology is very expensive and it takes a long time to install and maintain. Technological advances in the past have led to the development of more efficient ways of producing a product, thereby making it cheaper to produce and eventually, the price of the product falls. This is the same thing that has happened with electricity. The price of electricity has fallen over the years and the ability to produce more of the product at a lower cost

## **Energy Through the Ages: A Privilege Becomes a Right**

It would be difficult to find a student on any college campus who has not grown up with electricity and heating in his/her home unless the person was perhaps from a rural area. If one were to look at the parents of the students and ask the same question, there might be a few examples, and applied to grandparents, most likely many. Not only would it be common to find that most students grew up with these amenities, but they may also say that they could not live without them. Many aspects of American life have become completely dependent on something that was incredibly rare one hundred years ago.

While the technology to use electricity for appliances and heating homes was first discovered about 200 years ago, electrification of homes did not become common until starting in the 1920s. Of course, this technology was first available to those who lived in areas with many homes that could benefit, mostly cities (Household Electrification). In its infancy, electricity was very expensive to install making it much more attainable in cities where homes were located more closely together.

With its applications being so vast, it's puzzling at first to ponder why it took so long for homes to contain electricity. There are in fact many answers to this question. One answer seems obvious; the technology was expensive. As with any new invention, at first the technology is very expensive as there are no economies of scale established. Economies of scale is the term used to describe a firm gaining efficiencies in producing a product, thereby making it cheaper to consumers eventually. The basic premise of the theory states that as a firm produces a product, efficiencies are gained such as greater skill in the labor force, and the ability to produce more of the product at a faster and

cheaper rate over time (Hill, 184). In this case, it would take practice on both the part of the utility companies and those industries producing electrical appliances to eventually gain economies of scale: lowering the price of their product/service, and leading to a larger use of the product/service.

Though electricity's expense may be the first characteristic many see as a roadblock toward implementation, there was a much larger one. During its infant stage, many utility companies were unsure as to whether they wanted the idea of household electricity to succeed or not. As the Encyclopedia of American History points out:

Utility companies were not ready to make the substantial investments in infrastructure needed to meet the demand for industrial power and domestic lighting. Moreover, many utilities had complementary interests in supplying gas for home cooking and heating; the changeover to electrical heating seemed to threaten previous investments (Household Electrification).

Disregarding the fact that the technology was new and expensive, with its implementation utility companies did not want to kill one source of revenue only to substitute another. Utilities were experiencing large success with the recent advent of gasoline's use for cooking and heating and did not want to take on an investment that would interfere with their main source of revenue.

While it has only been a relatively short time since electricity within the home became commonplace, its presence is now so important that many people can't imagine a life without it. Many people do in fact find they cannot live without electricity quite literally. During heat waves for example, it's typically quite common to see elderly

people pass away when they are unable to access air conditioning. Just a few years ago, there was a dramatic case of this in France. In 2003, France experienced a heat wave that caused approximately 14,802 heat-related deaths. One article reports; “[the] bulk of the victims — many of them elderly — died during the height of the heat wave, which brought suffocating temperatures of up to 104 degrees in a country where air conditioning is rare” (France Heat Wave Death Toll Set at 14,802). Though France may not typically experience such extreme temperatures, this instance showed what could potentially happen when a country is struck by a heat wave, and does not have air conditioning. It’s typical for smaller-scale versions of this to take place in the United States each summer, such as in July of 2006 in California when the majority of approximately 140 heat-related deaths were attributed to elderly citizens without air conditioning (California Heat Wave Nears End).

While there are obviously some cases in which dependence on devices fueled by electricity are essential, there are many who believe there is an over reliance on electricity, which becomes wasteful. Most utility companies point out the wastefulness experienced in the cooling of one’s home in the summer. Many people choose to keep their homes very cool at around 70 degrees Fahrenheit during the hot months of the year, yet most utilities recommend keeping the thermostat set at 78 degrees Fahrenheit during these times (Today in Mississippi). While 78 degrees is a living environment that poses no threat of danger to life, many find this uncomfortable and would rather spend more money to ensure their complete comfort. This sort of behavior is considered by many to be wasteful.

## Modern Day Addiction to Resources

In recent speeches, President Bush has described the country as “addicted to oil” (State of the Union, 2006). At first the statement may seem like a hyperbole, but after a moment’s pause, it may be more apt than upon first consideration. One professor at Carroll College described the shock experienced by exchange students from Ireland upon first observing Americans circling parking lots to find the best possible parking spot. These students stated that in their country people parked as quickly as possible even if far away from the location because gas was simply too expensive and precious to waste (Wilson: Lecture 2/15/07). In addition to oil, the president could realistically make an accurate statement that this nation is addicted to natural resources if he wished.

The main reason many Americans find themselves using so many natural resources is for sheer convenience. With their aid, we may travel to anywhere in the world, heat or cool our home to our liking, open the garage door from our cars rather than taking the time to get out and do it manually, and an endless amount of unmentioned conveniences we have grown to expect. Put simply, life becomes much more complicated in the absence of resources such as natural gas, petroleum and coal.

While often overlooked, non-renewable resources and electricity share a profound relationship. The largest resource used in electricity generation is currently coal, a non-renewable resource. Coal produces approximately 50 percent of the United States’ electricity (Energy INFOcard – United States). It’s interesting to note that while coal accounts for such a large percentage of the nation’s production of electricity, only about 33 percent of the nation’s total electricity capacity is coal-based (EIA: Existing Capacity by Energy Source). Coal is a popular choice for electricity production because it is

currently very inexpensive, and there is a large amount of coal located in the United States (Minnesota Public Radio: Coal is Back).

Natural gas also remains a very popular non-renewable resource used in the production of electricity. Currently, about 44 percent of the nation's electricity production capacity comes from natural gas (EIA: Existing Capacity by Energy Source). About 19 percent of the nation's energy consumption was natural gas-based in the year 2005 (Energy INFOcard: United States). One of the difficulties with natural gas in the United States is our dependence on other countries to meet our needs. From 1990 to 1999, the United States' percentage of natural gas imports doubled from 8 to 16 percent (Increasing Importance of Natural Gas Imports on the U.S. Marketplace). By 2004, imports accounted for about 19 percent of the United States' natural gas supply (U.S. DOE: Oil & Natural Gas Supply & Delivery). The nation's desire to decrease dependence on foreign nations for essential supplies may be one strong indicator as to why less than half of natural gas' overall capacity is used toward actual consumption.

As can be seen from Appendix A, about 3 percent of the nation's electricity that was consumed was produced by petroleum. It's also important to note that from Appendix B it can be seen that approximately 6 ½ percent of the nation's electricity production capacity comes from petroleum-based operations. Up until the mid 1970's when there was an embargo placed on the United States by OPEC, petroleum had been used much more in electricity generation. High prices forced utility companies to think of different ways to produce electricity other than with petroleum (Overview – Electricity Generation). Aside from its scarcity, petroleum is also a less than ideal resource to use for electricity generation because of its particular usefulness in other sectors. Petroleum

is used more in the transportation, industrial, and residential and commercial sectors than it is by utilities (Energy in the United States 1635-2000). With much pressure from all angles to decrease foreign dependence on oil, it is in the best interest of utility companies to search for alternative means of producing electricity.

## **Planning**

Over the summer of 2006, I received an internship position with Avista Utilities in Spokane, Washington. The position was with the Resources Planning and Energy Supply Analyses Department. Though I knew little about what would be performed by the department initially, I soon became fascinated by my surroundings. As it turned out, this department's work revolved around many of the nation's headlines. What made the work even more fascinating however was that I was able to experience what the news could not or would not explain. As most media outlets continued to vilify utility companies and talk about the strain each person felt in his or her pockets, I witnessed the strain placed on the company as well.

This department made up of four people (not including myself), was responsible for projecting future demands for energy consumption and allocating the resources that would provide the sums of energy required in the forecasts. The reports primarily consisted of current information that was used to generate long-run forecasts (about 20 years away). Contrary to what many people might think, environmental scientists did not run the department. Instead, this small department was managed by an economics major, and staffed by an economics professor, a finance major, and an engineer. The diverse skills contained by those in the group allowed for contemplation of energy problems from both practical and economic standpoints.

In all fields of business, not just utility companies, strategic planning plays a large role in the success of a company. Strategic planning is said to provide three major benefits; a clearer sense of strategic vision for the firm, a sharper focus on what is strategically important, and an improved understanding of a rapidly changing environment (Wheelen, 5). From the description of these three primary benefits, it can be seen why strategic planning may prove incredibly useful in the utilities industry. The utilities industry is subject to constant changes in both the wants of the consumers and the technology used to provide their product to the customers. In addition to being subject to these changes, many of the decisions made by utility companies command large sums of money, thereby making planning a necessity. Lastly, as mentioned previously, the services utility companies provide are now seen as a necessity, making planning essential to ensure uninterrupted delivery of these services as much as possible.

### Functions of Planners

There's one tool that's absolutely essential to any modern-day planning department in a utility company; the computer. When not in meetings, planners spend much of their day working with software applications that are capable of handling the variables included in making accurate predictions for necessary resources and their allocation. Proficient planners work with a large knowledge of a database program such as Microsoft Access, a spreadsheet program such as Microsoft Excel, and advanced market modeling applications such as Aurora (Aurora is able to take current data and create predictions for the future regarding resource availability and overall usage). Information supplied from one program may often be used simultaneously in another program. For instance, market price forecasts generated from Aurora are often imported

into Microsoft Excel where a spreadsheet may be created to administer calculations and graph forecasts in a way the general public may comprehend.

It was not long ago that planning departments did not have the computer resources to handle many of their tasks. In a way, planning departments were more limited in their scope, and certainly much less productive without modern-day software capabilities. The sheer amount of time it takes to create graphs by hand as compared to using a computer software application limited a planning department's capabilities. Currently, many planning departments find themselves searching for more computer space and processing capabilities in an attempt to improve the accuracies and efficiencies of their forecasts. In one meeting over the summer of 2006, a visiting corporation remarked of its jealousy over Avista's capabilities to process data quickly through their newly upgraded system that contained one terabyte of storage and a large bank of personal computers (Internship Experience, Summer 2006).

#### Capacity Consumption and Load:

There is a large difference between two words that can mistakenly be used interchangeably when referring to electricity. These words are "capacity" and "consumption". While the words are simple enough to define and understand, it's important to distinguish between the two, understanding which term is used when looking at figures relating to electricity. When someone is describing electricity consumption, this of course relates to the actual usage, that is, how much electricity the consumers used in a given amount of time. Capacity refers to the potential production of electricity. Capacity will always be either greater than or equal to consumption, as it is

impossible to consume more electricity than is produced (National Institute of Standards and Technology).

An individual can tell a lot by comparing electricity capacity to consumption. While the actual amount of energy produced may differ significantly from that resource's capacity, comparing overall capacity percentages to overall consumption percentages can tell an individual how popular a resource currently is for providing electricity. For example, if one resource is said to occupy 50 percent of the nation's total electricity producing capacity, yet this resource is only producing 10 percent of the nation's energy that is consumed, this resource may not be very popular at the moment. This statement can be made because there is a large amount of capacity for energy production that is going unused in the described scenario. There are a variety of reasons that some resources may not be popular at the moment including efficiency, availability, and price (Avista: IRP 7-1).

In addition to measuring capacity, utility companies such as Avista often choose to break things down into load and resources to ascertain where there is a gap between expected use of electricity, and the potential to make that electricity. In Avista's Integrated Resource Plan they define load as "how much capacity and energy customers are expected to consume during the length of the planning period". Resources are later defined as "the generating assets owned, or controlled through contracts, by the company" (Avista: IRP 2-1). These two key terms have the potential to tell a utility company a lot about the future. From knowing both the expected load, and the current amount of resources along with any predicted acquisitions, a planning department may

present a reasonably accurate statement outlining a particular course of action for the company to pursue.

### How Much Energy can be Provided Currently?

It may be very intimidating to the general public to hear terms such as megawatts and gigawatts thrown around by experts, without first having a general understanding of what such terms actually represent in a practical sense. It's difficult to pinpoint exactly how many homes one megawatt of power is capable of supplying. This difficulty comes from inconsistencies in homes such as one home may have central air conditioning while another may not, one may have many large appliances while another may not, one home may have residents that work various shifts and are therefore using amenities at different points of the day...etc. It used to be widely stated that one megawatt was enough to power approximately 1,000 homes. This has been updated however due to the aforementioned irregularities in this assumption. These irregularities make it difficult to create a firm estimate, but it is typical to state that one megawatt is enough to power somewhere between 400 to 900 homes (What is a megawatt?).

With an estimate that is so broad, many might wonder how much electricity the United States actually consumes and where it comes from. In a report that was released by the Energy Information Administration in July of 2006, the United States consumes approximately 3716.69 billion kilowatt-hours (kWh) of electricity in the year 2004. With a current population of about 298 million people, this amounts to approximately 12,500 kWh of electricity consumed yearly by each person in the U.S. One interesting note is that with a larger overall population of 727 million people and a smaller overall consumption level, the average person living in Europe consumes about 4,425 kWh of

electricity each year (World Factbook). One kWh is defined as a unit of energy equivalent to one kilowatt (1 kW) of power expended for one hour (1 h) of time (Whatis.com: kilowatt-hour). The kWh is a convenient unit to express electricity as it is relatively easy to convert into larger units. One megawatt-hour for example is equivalent to one thousand kilowatt-hours.

Overall, the amount of energy that can be provided is going to be specific to a given area. Some areas of the country use large quantities of energy due to their dense population or large amounts of industry, while other sparsely populated areas of the country use much less energy. Another large factor of energy usage is an area's climate. Areas with very warm or very cool temperatures will use more energy than areas with more moderate climates. One of the duties of a utility planning department is to assess this situation for its respective area. In Avista's Integrated Resource Plan, utility owned and leased resources are taken into account and subtracted from future load projections for its service area. This serves as a starting point toward figuring out what the company must do in the coming years to serve future load growth (Avista: IRP 2-1).

#### Sensitivity Analyses and Stochastic Generation of Variables:

One very powerful tool that aids in planning is the conduction of a sensitivity analysis. A sensitivity analysis allows the user to analyze what happens to an optimal solution when one or a multiple number of inputs are changed (Parker: Lab 1/24/07). In the planning process for a utility company, sensitivity analyses are conducted regularly so that the planning department may analyze which variables have the most effect on what resources may be used to provide electricity in the future. One obvious variable that might be changed in a sensitivity analysis is the price of gas. Modelers want to know the

effects that a fluctuating price of gas has on the overall price of electricity and suggested mix of resources produced by a model. A high price of gas may alter a model's recommendation in ways that would reduce the overall usage of gas and focus on cheaper resources. Another sensitivity analysis might revolve around the overall net present value of a project the company was considering undertaking with respect to the discount rate as a variable. Again, the discount rate is a rapidly fluctuating variable that might influence whether or not undertaking a decision is a wise move for a company. Sensitivity analyses may be used with many variables and produce valuable results to be used in the decision-making processes of a utility company.

One way to improve the efficiency and reliability of sensitivity analyses is through the use of stochastic variables. Stochastic is defined as "of or pertaining to a process involving a randomly determined sequence of observations each of which is considered as a sample of one element from a probability distribution" (Dictionary: "Stochastic"). These stochastic analyses allow the individual creating the model to calculate for uncertainties within the market. With electricity production being based on so many random variables such as temperature, weather patterns, time of day, and fuel price, it's difficult to run accurate simulations using one hypothetical value.

Planning departments typically opt for running a range of values that have been generated stochastically in their models. These stochastically generated numbers are useful largely because they are unbiased as the computer simply randomly generates the variables. The numbers are also useful because the computer can run many iterations creating a large range of hypothetical values. Avista states in their Integrated Resource Plan that "stochastic analysis is performed using probability distributions for load, fuel

price, hydroelectric and wind generation data, rather than by using single point estimates” (Integrated Resource Plan 5-4). The report states later that the stochastically generated variables were generated using 200 sets of unique input, which would account for many different scenarios (Avista: IRP 5-4).

Although stochastic analyses provide greater accuracy to studies, there are unfortunately several disadvantages to stochastically producing variables for figures that are subject to large inconsistencies. The main disadvantages to this process are the time and the computer space required for such a large process. In their Integrated Resource Plan, Avista makes mention that the stochastic process took “nearly 5,000 hours of computer processing and 300 gigabytes of data storage for each stochastic study” (Avista: IRP 5-5). It can be seen from this that it’s important to check the accuracy of one’s assumptions before launching such a large and time consuming process. While using stochastic variables provides greater accuracy, it may be the case that some planning departments are not equipped to handle such large volumes of information or match such demanding processing capabilities.

#### Opportunity Cost and its Relation to Public Opinion

One concept that is widely used in planning for future utility resource allocation is that of “opportunity cost”. Opportunity cost is a concept used largely in economic studies and is described as “the amount of other produces that must be foregone or sacrificed to obtain one unit of a specific good”. Implicit in this definition are the assumptions that resources are scarce relative to human’s wants, and people must make choices as to how they will best fulfill their wants (McConnell, 27).

Opportunity cost is so very applicable to the utilities industry because of the limited number of resources aspect of the definition. Some of the costs dealt with in the decisions of utility companies include time horizons, financial costs, and safety. For example, consumers have recently been very concerned about the costs associated with their utility bills. One suggestion that is common in the largely populated state of California is to run large appliances during “off peak” hours. Off peak hours occur late at night through early in the morning, and customers are given a discount for using electricity during these hours as compared to “on peak” hours (Riverside Public Utilities). In this example, convenience is an opportunity cost for the consumer. If the consumer is willing to give up some convenience associated with freedom to run large appliances at any given time, he/she can save money.

In order to increase the accuracy of their predictions, planners must be aware of what is going on in the world around them. Discussions in the legislature can be windows as to what may take place in the future. Employees at Avista Utilities were continually kept abreast of current issues pertaining to energy and the legislation as well as issues regarding any of the projects the company was currently involved in. Employees were encouraged to review a daily publication produced by the corporation that contained the day’s important issues in these respects. Each employee received this information in his/her email account. *Such important information may have included current lawsuits involving the utilities industry to issues in the legislation that might affect generation and transmission methods in the future (Internship Experience, Summer 2006).*

## Scenarios:

With respect to innovation, it has been said that, “within any corporation that wishes to innovate new products, there must be an attitude present that allows for risk and a willingness to accept failures that often accompany risk-taking” (Wilson: Lecture 2/22/07). The planning department at Avista represents a department that must be willing to take some risks in their predictions. Because many of the predictions placed in the Integrated Resource Plan extend as far as twenty years into the future, some guess work is expected in many of the assumptions used in the analyses.

While many of the studies take data trends from the current usage and extend the trend lines into the future accounting for population growth, other studies are conducted as “scenarios”. Scenarios are studies where an assumption is made about a situation that could potentially occur, but there is also a probability that it will not occur. In Avista’s latest Integrated Resource Plan for example, at one point in the summer I was asked to study the effects of what would happen if people were to start using electric cars much more over the next ten years. With technology looking promising and becoming cheaper, consumers are becoming more aware about the potentials electric cars offer. With an assumption that over the next ten years electric cars would replace gasoline cars at a rate of 10% per year, and calculations as to how much electricity each electric car would use, a study was conducted to see the impacts on the nation’s load capacity. The numbers generated from calculations in a scenario are able to be placed in modeling software such as Aurora, similar to other studies conducted. Aurora then creates a model of what the load would be like with respect to the scenario and planners may decide what resources should be used to provide for this increase in electricity consumption.

### Modeling Concerns:

One of the limitations of modeling is that inputs are entered by humans and therefore susceptible to error. Typically, large models can require several iterations to make sure errors have been corrected and an accurate forecast is created (Internship Experience, Summer 2006). Also, with humans creating the models, the inputs that are available in the model are often subjective in nature. For instance, what one utility company may be looking for as an input or a calculation may be absent from the model altogether because the person who designed the model saw no use for this feature. To avoid this problem, it is useful to have people who possess an in-depth understanding of the industry design the modeling software.

Another concern with respect to modeling is the feasibility of solutions the models generate. As discussed earlier, humans place different levels of importance on different aspects regarding utilities. For instance, if a model generated a solution that required the building of many nuclear plants for an adequate supply of energy this solution might not be feasible given the public's resistance toward nuclear power. Another way in which a model may be infeasible is through the exactness of its solution. Oftentimes, modeling software provides answers that are too exact and must be interpreted by humans (Lecture: Parker, 2/10/07). With respect to utilities, a model might generate an optimal solution of a resource mix down to a decimal of a megawatt. This would be too exact and require careful analysis by a planning group as to the feasibility of the solution. Modeling applications' human counterparts must be aware of the models' shortcomings and prepared to interpret the results carefully.

### Submitting a Final Recommendation:

After a utility company has considered all the important variables involved in resource planning including what resources are available, how much of each resource is available, costs of the resources, and the public's opinion, the planning department presents their final recommendation. At Avista Utilities, this final recommendation was contained in the Integrated Resource Plan, near the end and is known as the "preferred resource strategy" (Avista: IRP; 7-1). As one can see from the variety of considerations that go into making a recommendation, the preferred resource strategy can be a complicated process requiring large amounts of time. Avista's Integrated Resource Plan is quick to point out the "often conflicting criteria of resource planning" (Avista: IRP 7-1). In making a final recommendation the concept of opportunity cost is once again very important, requiring planners to ponder the implications of giving up some quantity of one benefit for the purpose of receiving some quantity of a different benefit.

One important understanding in resource planning is that no plan will please every one of its customers 100 percent. Given the subjective wants of humans, there are bound to be disagreements between the company's customers, and potentially within the planning department. Instead, it should be the goal of a planning department to submit a recommendation that is the best "big picture" plan, satisfying as many elements from as many criteria possible in a practical sense. Avista states this sentiment well in their Integrated Resource Plan saying;

The [Preferred Resource Strategy] generally is not capable of providing an optimal outcome when measured against each resource-planning criterion, and/or market condition individually. Instead a PRS should perform strongly across the

various criteria and the range of possible future market conditions, when compared to other resource strategies. Herein lies the largest challenge facing electric utility resource planners today (Avista: IRP, 7-1).

Planners must become comfortable with the concept of not being able to fully please everyone with their decisions in order to succeed in planning. Instead, it is most important that the planners keep an optimistic attitude and try to please society as a whole with each decision.

Ultimately, a final recommendation issued from the company's planning department will differ from location to location. Each utility company must remember that while it may be a monopoly, the goal is to serve the wishes of its customers. In this respect, each location's customers may emphasize different attributes of power generation and supply. Also, each utility must be realistic as to what resources are available for use and acquisition. For example, Avista emphasized the importance of acquiring large amounts of wind capacity by the end of 2026, feeling this was a reasonable and proper mode of action (Avista: IRP 7-5). For another area in the country that is more densely populated and would not have as much access to wind projects as Washington, this might not be a reasonable suggestion.

### **Important Issues in the Utilities Industry**

#### Deregulation:

Many people are hesitant of the notion of utility companies selling energy capabilities, particularly since the Enron catastrophe. Selling energy capabilities however, is a concept that when employed properly, benefits both the utility companies in the form of profits that may be used toward research and expansion, and their

customers in the form of lower rates. The concept of deregulation is fairly simple and is best explained by the following quote:

Legislatures and the public utility commissions of many states have opened retail competition for electricity supply. The measures allow consumers of electricity to choose their supplier of electricity, (generation), while the delivery of the power, (transmission and distribution), will still be the responsibility of the incumbent, (regulated), power company (Deregulation: The Basics).

As can be seen, deregulation, when put into proper practice, has the customer's home utility company competing for the best rate possible for its customer. At times, it may be in the best interest of consumers to have its "incumbent power company" purchasing the generation from someone else and save money. Another area may be able to supply power at a cheaper rate than the home company could produce it using its own resources, benefiting all parties involved.

Buying energy from this market is a common occurrence for densely populated areas such as California. With its massive amount of citizens and high temperatures, California often finds itself in need of more energy than is produced within the state (California Can Tame Its Crisis). During the summers, California often experiences heat waves and droughts that leave its citizens requiring more energy than surrounding states. With a deregulated energy market, California may purchase energy from other generating facilities whose citizens do not need all that is capable of being produced. California is of course the state that made Enron rich, and the concept of deregulation infamous.

One of the scariest thoughts behind a concept such as deregulation is the potential for utility companies to take advantage of their customers in numerous ways, creating

higher prices for the customers. People may often wonder, what is in place to ensure deregulation functions properly with little or no harm to society. The Federal Energy Regulatory Commission (FERC) is the federal agency responsible for this task. FERC states in its mission statement:

The Federal Energy Regulatory Commission, or FERC, is an independent agency that regulates the interstate transmission of electricity, natural gas, and oil. FERC also reviews proposals to build liquefied natural gas (LNG) terminals and interstate natural gas pipelines as well as licensing hydropower projects (FERC: What FERC Does).

Similar to what the implementation of Sarbanes Oxley did to accounting standards after to the Enron scandal; FERC has become much stricter as well. FERC clearly outlines standards that are to be used when trading energy, and may audit to ensure that such practices are followed routinely. At Avista Utilities in Spokane, every employee is required to watch a video that explains the basics of FERC and the energy trading process, regardless of whether the person would be working on trading transactions or not (Internship Experience: Summer, 2006).

#### Planning Departments and Deregulation:

It is the job of the planning department to prescribe the best course of action that increases the strength and longevity of the company. Using all of the facts available to them, each planner must be aware of what ideas are in the best interest of the company. For instance, it might be tempting for an outsider to desire a course of action that led the company to purchasing enough resources to cover energy demands at all points of the year, for every hour of the day. It is the job of the planning department to show that this

course of action is not desirable, as it is not economically feasible. If one were to maintain control over all of the resources that would meet even the highest of demand periods at all times, it would be quite wasteful. Utility companies should focus on maintaining supply for its reasonably expected loads, disregarding extreme outliers. In states with deregulation, it is in the best interest of utility companies to use only what energy is necessary to supply its customers with power and sell their excess energy capabilities to other utilities (Transcript: Energy and the Role of Utilities).

#### If Deregulation in Itself Isn't Bad, What Went Wrong With Enron?

Most people get a chill down their spine just hearing the name "Enron". While the company's name has plagued headlines and become synonymous with corruption over the course of the past few years, few people actually understood Enron's business concept. Enron, in its existence, was dubbed "the world's largest energy trading company". Briefly, Enron's business was creating contracts for the delivery of natural gas, and electricity that would occur in the future (Enron Explained). Although there were many aspects of Enron that caused a large amount of public strife, and for the company to go bankrupt including false accounting practices, this section of the thesis will only focus on the aspects of Enron that relate to energy trading.

One of the reasons the term "deregulation" often carries such a negative connotation is because Enron pushed congress so hard for deregulation. Beginning in 1990, Enron had a large presence in Washington DC where they attempted to explain that deregulation of the energy market was in the best interest of the consumers (Center for Public Integrity: Enron's Deregulation Fight). Once the top executives were able to

convince congress that deregulation was a smart idea, it was time for Enron's business to expand rapidly.

With deregulation in place, Enron was able to make most of their money by creating contracts to both buy and sell energy. Enron was able to buy energy when it felt it was a good deal and store it, selling the energy later at a much higher price to someone else who needed it (Enron Explained). This created a convenient market for both producers and users of energy alike. When a firm needed either to sell excess energy, or purchase energy to makeup for a shortfall, Enron, as the world's largest energy trading company, was a well-known venue. In addition to these contracts, Enron also engaged in the selling of future contracts between suppliers and consumers where each side takes a gamble that the price of energy in the future will or will not fluctuate. In these transactions, the buyers are hoping that prices will rise over time, and they will have secured a better deal than what the market offers as a price at the time of use (BBC News: Enron Timeline).

Enron was able to take advantage of California for several reasons. By former governor Gray Davis' own admission, California's deregulation act was flawed because, "it failed to do what every other state did which deregulated-- which is to say to the people who bought the power plants the utilities were forced to sell off, "You must sell us that power back here in California. You must serve our needs first" (Frontline: Blackout: The Roots of the Crisis). Without specifying for this generation capacity to be sold in the California community above all others, a shortage was created. Companies who now owned the generation capacity would rather sell in the open market to the highest bidder. Now, California not only did not have a guaranteed capacity for its citizens, it would

have to compete against other states in the open market and pay a premium for the power generated within its own state.

Another flaw in the legislation that enacted California's deregulation pertained to contract formation. California's deregulation laws forbade utility companies from entering contracts with electricity generators for a set price in the future. Without the ability to enter such contracts, California's utility companies were forced to buy energy from the "spot market", which is where short-term energy deals are made. The spot market is characterized by volatility in both supply and prices. Spot prices are ruled by the laws of supply and demand meaning that in times of energy shortages, prices were very high. The energy spot market occurs in real-time, where prices and trades are updated by the second (Energy Dictionary: "Spot Market").

During the times when California needed the most energy in the summer of 2001 is when Enron was able to generate huge sums of profits. Although there was already a large scarcity within the energy market, Enron managed to create a higher demand through false shortages. In the documentary, The Smartest Guys in the Room, recorded phone conversations between Enron traders and workers at power generation plants are played. These actual conversations display the greedy nature of the traders as they ask power plant operators to do anything that may spike demand, including faking blackouts through forced power outages. At Enron, the traders were paid a commission for every transaction, thereby increasing incentives for unethical traders to spike demand by any means possible (Film: The Smartest Guys in the Room).

## **Looking Toward the Future:**

With the human race continuing to grow, the world is becoming smaller, and resources are being depleted more quickly. Bearing this in mind, there is much work to be done to provide for energy needs in the future. Although blackouts have already begun due to the inability to meet current energy demands, the demand for energy between now and 2030 is expected to increase annually by about 1.3 percent (Prediction of Energy Consumption Worldwide). A report by the United States' Government Accountability Office stated: "[despite] growing dependence on foreign energy sources, DOE's R&D budget authority for renewable, fossil, and nuclear energy technologies declined by over 85 percent (in real terms) between fiscal years 1978 and 2005 (Report to Congressional Requesters: Results in Brief)". While this fact is certainly disappointing, it does not necessarily mean that research in these areas has been halted; instead it may be that much of the research has shifted from a federal governmental responsibility to a concern of the private sector and individual states' governments (Report to Congressional Requesters: Results in brief). This section highlights a few of the areas utility companies are looking in order to serve the future energy needs of customers.

### Wind Power

Currently, many think that wind power will be one of the best sources of cheap renewable energy in the future. Some go as far as to say that even now, wind is the most cost-effective source for electricity in the country when one takes into consideration the amount of costs that go into finding and extracting fossil fuels that are cheaply burned for energy (The Future of Wind Power). Some may worry as to how much energy wind is truly capable of providing, but a study conducted in 1991 stated that the United States'

three windiest states alone had enough potential electricity through their wind to provide the entire nation with power (Wind Energy Could Fuel Future Power Needs). This study does not take into account the further development of wind turbine design and other technological factors relating to electricity production that have improved since this time. Also, the study was based on only three states, leading one to only imagine how much electricity might be produced if all potentially stable locations were utilized.

While the largest advantages to wind energy are its cleanliness and the fact that it is renewable, there are also some drawbacks to wind power. One thing that first comes to the mind of the consumer is the unsightliness of wind turbines. Wind turbines must be tall and large to produce any significant amount of electricity. Wind turbines are also very noisy when they are in operation. Both of these attributes would adversely affect the likelihood of the implementation of wind turbines in densely populated areas. Another drawback to wind power is that it is not constant. That is, when the wind is absent, wind turbines do not function and therefore no electricity can be produced (Lenntech: FAQ Air and Energy). Lastly, in the short-run, wind power is expensive. Many countries that have implemented wind power to their resource portfolios for electricity generation complain of its expense citing it as “three times more expensive than conventional electricity (Report Doubts Future of Wind Power). It should be recognized however that the implementation of wind power is in its infancy. While wind may be costly now, it will become cheaper later through the benefits of economies of scale experienced by makers of wind turbines and utility companies as they gain experience in the implementation of the new technology.

### Conservation:

One of the most popular methods of providing energy in the future remains educating people on how to conserve energy now. One source states; “No matter how your energy is produced, it is cheaper to not use it in the first place”. The article later points out that every dollar spent on conservation amount to five dollars saved on generation (Energy Alternatives: Conservation). Many utility companies have found it to their benefit and their customers’ benefit to educate consumers on conservation. In the long-run, both the utility companies and their customers benefit from conservation of energy in the form of cheaper rates. Conservation on high-demand days can also keep utility companies from having to buy energy from the aforementioned “spot market” where all parties involved would pay premiums (Penn State: Energy Conservation Benefits). In a time when the population is so large and energy is so scarce, every effort to conserve benefits society.

### Coal:

Much to the dismay of many environmentalists, utility companies are still planning to use a large amount of coal to generate electricity in the future. As stated earlier, coal is a cheap and efficient way to produce electricity, and there is a vast supply of this resource within the United States. Unfortunately, coal also gets a bad name from many environmentalists who cite it as a major pollutant. Some of these environmentalists often chose to not point out that coal-fired electricity production has become a much cleaner process in recent years. In fact, since the passing of the Clean Air Act in 1970, electricity production from coal has tripled, and the process now releases 1/3 less pollutants. Each year, coal is becoming cleaner and more efficient in the process of

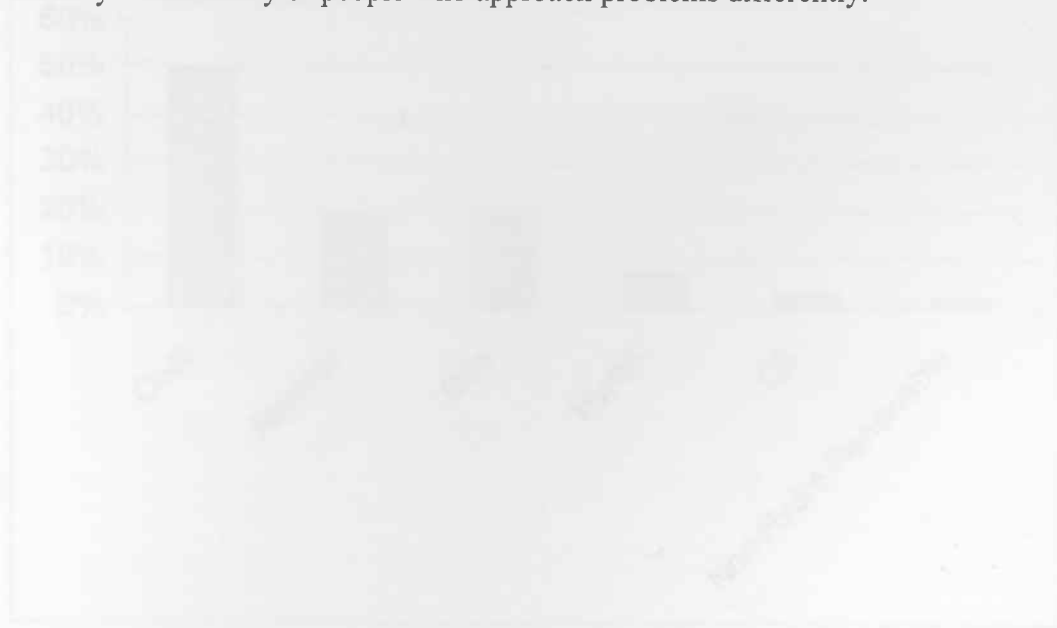
producing electricity with the aid of EPA-enforced standards in coal plants. While coal may not be the cleanest resource available at the moment, many utilities see coal's benefits outweighing its risks (Partners for Affordable Energy: Environment).

**Conclusion:**

With an in-depth discussion of both the functioning of a planning department in a utility company and the current issues plaguing the industry, a number of questions may come to the reader's mind. It has been the goal of this thesis to encourage those who have not given the future state of energy any thought, to begin to do so. The problems of limited capacity and a finite supply of energy resources must be dealt with now rather than later. Each year we wait to recognize these problems, the deeper-rooted the problem becomes, making the solution longer and more expensive than before.

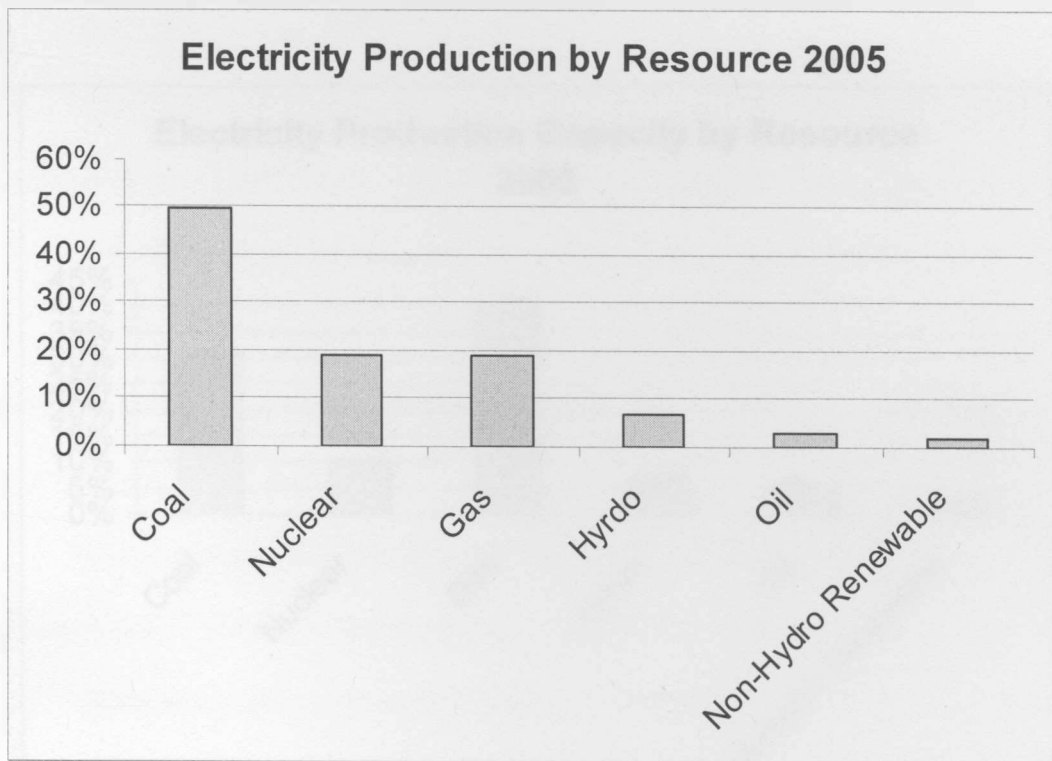
There is not one single solution to the world's energy problems, but rather typically a combination of many solutions. Conservation, while helping dramatically, is not able to solve all of the world's energy problems. We must also rely on technological advances in aiding energy needs. Simple advancements in recent years such as energy-saving light bulbs, thermally insulated windows, and hybrid cars have reduced energy needs and will continue to do so in the future. The future also looks bright for technologies such as fully electric cars, wind power, and solar power. It's also important to realize the cost of such energy-saving initiatives and the fact that not everyone may be able to afford the technology initially. Thermally insulated windows cost more than standard windows, and hybrid vehicles are more expensive than their gas counterparts, but a small monetary loss may amount to a larger overall gain in quality of life.

Another goal of this thesis has been to inform the reader of just some of the jobs available within the business community. It seems that some people often become myopic, thinking that business majors belong in banks, biology majors belong in labs...etc. This sort of thinking is both limiting and false. Some of the most exciting issues currently taking place in our nation are receptive to graduates of almost any study. While planning for the nation's energy needs and creating a plan to meet these needs may seem to many like a job for an environmental sciences majors, simply look at how many business skills can be applied. Skills from finance, economics, marketing, and other business essentials translate directly into a typical job in the resource planning department. Society's problems require various skills and abilities. The best solutions to complex problems will most likely be found through the proper application of knowledge provided by a wide-array of people who approach problems differently.



**Appendix A: Electricity Production by Resource 2005**

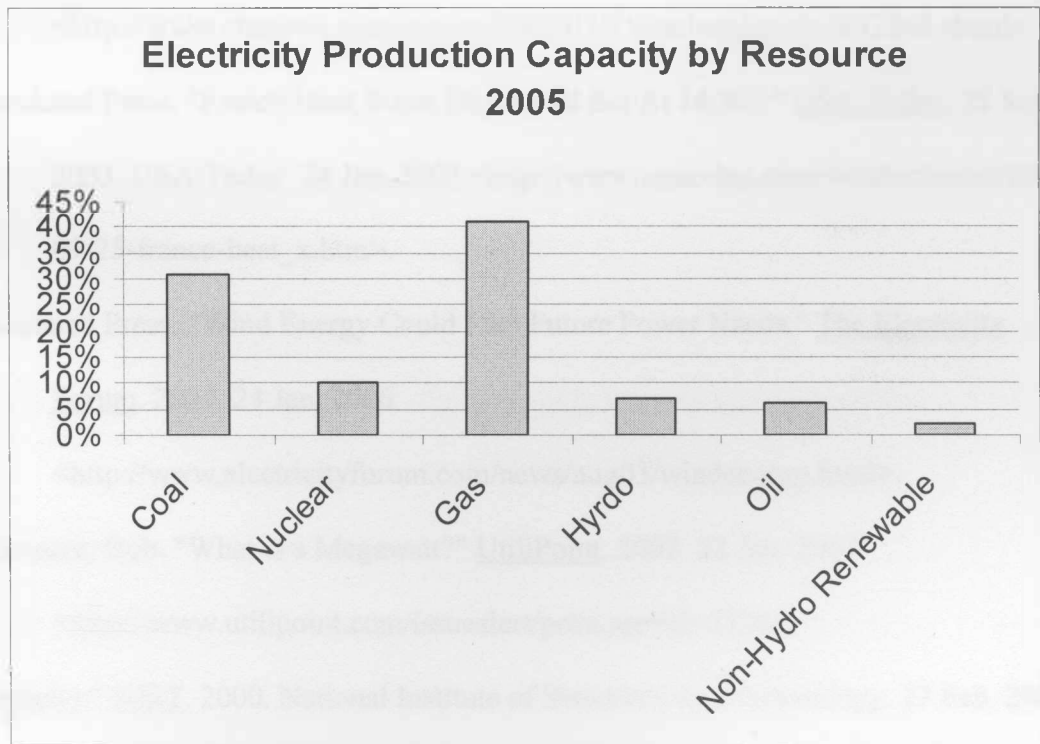
<b>Resource</b>	<b>Production</b>
Coal	50%
Nuclear	19%
Gas	19%
Hydro	7%
Oil	3%
Non-Hydro Renewable	2%



Source: EIA: Energy INFOcard – United States

**Appendix B: Existing Production Capacity by Resource 2005**

<b>Resource</b>	<b>Capacity</b>
Coal	31%
Nuclear	10%
Gas	41%
Hydro	7%
Oil	6%
Non-Hydro Renewable	2%



Source: EIA: Existing Capacity by Energy Source

## References

- 2005 Electric Integrated Resource Plan. Spokane, WA, 2005. 2005 IRP. 10 Nov. 2006  
<<http://www.avistautilities.com/resources/plans/2005IRP.asp>>.
- Archibold, Randal C. "As Heat Soars in California, Power Supply is Strained." New York Times. 25 July 2006. New York Times. 12 Feb. 2007  
<<http://www.nytimes.com/2006/07/25/us/25power.html?ex=1311480000&en=46e44c8699061a47&ei=5088&partner=rssnyt&emc=rss>>.
- Associated Press, and Cbs . "California Heat Wave Nears End." CBS News. 29 July 2006. CBS. 21 Jan. 2007  
<<http://www.cbsnews.com/stories/2006/07/25/national/main1832269.shtml>>.
- Associated Press. "France Heat Wave Death Toll Set At 14,802." USA Today. 25 Sept. 2003. USA Today. 24 Jan. 2007 <[http://www.usatoday.com/weather/news/2003-09-25-france-heat\\_x.htm](http://www.usatoday.com/weather/news/2003-09-25-france-heat_x.htm)>.
- Associated Press. "Wind Energy Could Fuel Future Power Needs." The Electricity Forum. 2007. 24 Jan. 2006  
<<http://www.electricityforum.com/news/aug03/windenergy.html>>.
- Bellemare, Bob. "What is a Megawatt?" UtiliPoint. 2007. 22 Jan. 2007  
<<http://www.utilipoint.com/issuealert/print.asp?id=1728>>.
- "Capacity." NIST. 2000. National Institute of Standards and Technology. 27 Feb. 2007  
<<http://www.nist.gov/dads/HTML/capacity.html>>.
- "Consumer Expenditures in 2004." Bureau of Labor Statistics. Apr. 2006. U.S. Department of Labor. 21 Jan. 2007 <<http://www.bls.gov/cex/csxann04.pdf>>.

- "Control Power Costs Through Wise Use." Today in Mississippi. Electric Power Associations of Mississippi. 15 Jan. 2007  
<<http://www.todayinmississippi.com/editorial05.04.html>>.
- "Conversion Factors." National Council of Examiners for Engineering and Surveying. National Council of Examiners for Engineering and Surveying. 1 Mar. 2007  
<[http://www.ncees.org/exams/study\\_materials/fe\\_handbook/fe\\_conversion\\_factors.pdf](http://www.ncees.org/exams/study_materials/fe_handbook/fe_conversion_factors.pdf)>.
- "Cut Oil Imports: Al Gore's Global Warming Tips." Cut Oil Imports. 13 Jan. 2007. 23 Jan. 2007 <<http://cutoilimports.blogspot.com/2007/01/al-gores-global-warming-tips.html>>.
- "Deregulation: the Basics." Good Energy. 2007. Good Energy. 21 Feb. 2007  
<[http://www.goodenergy.com/electricity\\_deregulation/deregulation.aspx](http://www.goodenergy.com/electricity_deregulation/deregulation.aspx)>.
- "Energy INFOcard 2005." Energy Information Administration. Oct. 2006. Energy Information Administration. 25 Jan. 2007  
<<http://www.eia.doe.gov/neic/brochure/infocard01.htm>>.
- "Energy in the United States: 1635-2000." Energy Information Administration. Energy Information Administration. 27 Jan. 2007  
<<http://www.eia.doe.gov/emeu/aer/eh/petro.html>>.
- "Energy Kid's Page." Energy Information Administration. Oct. 2006. Energy Information Administration. 25 Jan. 2007 <<http://www.eia.doe.gov/kids/infocardnew.html>>.
- "Enron: Timeline." BBC News. BBC News. 13 Feb. 2007  
<[http://news.bbc.co.uk/1/hi/english/static/in\\_depth/business/2002/enron/timeline/3.stm](http://news.bbc.co.uk/1/hi/english/static/in_depth/business/2002/enron/timeline/3.stm)>.

"Existing Capacity by Energy Source." Energy Information Administration. 4 Oct. 2006.

Energy Information Administration. 12 Feb. 2007

<<http://www.eia.doe.gov/cneaf/electricity/epa/epat2p2.html>>.

"FAQ: Air and Energy." Lenntech. 2006. 27 Feb. 2007 <<http://www.lenntech.com/FAQ-air-energy.htm>>.

Fox-Penner, Peter. "Energy Deregulation." Progressive Policy Institute. 19 Mar. 2001.

Progressive Policy Institute. 12 Feb. 2007

<[http://www.ppionline.org/ppi\\_ci.cfm?knlgAreaID=116&subsecID=155&contentID=3170](http://www.ppionline.org/ppi_ci.cfm?knlgAreaID=116&subsecID=155&contentID=3170)>.

"The Future of Wind Power." Illustrated History of Wind Power Development. 2005.

TelosNet. 20 Feb. 2007 <<http://www.telosnet.com/wind/future.html>>.

Harding, Luke, John Vidal, and Alok Jha. "Report Doubts Future of Wind Power."

Energy Bulletin. 25 Feb. 2005. The Guardian (UK). 20 Feb. 2007

<<http://www.energybulletin.net/4527.html>>.

Hill, Charles W. International Business. 6th ed. Boston: McGraw-Hill Irwin, 2007. 184.

"Household Electrification." Answers.Com. 2007. Answers.com. 14 Jan. 2007

<<http://www.answers.com/topic/electrification-household>>.

"Increasing Importance of Natural Gas Imports on the U.S. Marketplace." Energy

Information Administration. Feb. 2000. Energy Information Administration. 24

Jan. 2007 <<http://tonto.eia.doe.gov/FTPROOT/features/200002sr02.pdf>>.

"International Electricity Consumption." Energy Information Administration. Energy

Information Administration. 25 Jan. 2007

<<http://www.eia.doe.gov/emeu/international/electricityconsumption.html>>.

Ismail, M. A. "Enron's Deregulation Fight." The Center for Public Integrity. 6 Jan. 2003.

The Center for Public Integrity. 12 Feb. 2007

<<http://www.publicintegrity.org/report.aspx?aid=103>>.

Joskow, Paul L. "California Can Tame Its Crisis." MIT. 13 Jan. 2001. MIT. 15 Jan. 2007

<[http://econ-www.mit.edu/faculty/download\\_pdf.php?id=557](http://econ-www.mit.edu/faculty/download_pdf.php?id=557)>.

"Kilowat-Hour." Whatis.Com. 2007. Tech Target. 2 Mar. 2007

<<http://www.nist.gov/dads/HTML/capacity.html>>.

Macqueen, Val. "Les Hypocrites Dangereuses." FrontPage Magazine. 28 Aug. 2003.

FrontPage Magazine. 14 Jan. 2007

<<http://www.pbs.org/wgbh/pages/frontline/shows/blackout/themes/california.html>  
>.

McConnell, Campbell R., and Stanley L. Brue. Economics: Principles, Problems, and

Policies. 16th ed. Boston: McGraw-Hill Irwin, 2005. 27.

"Oil & Natural Gas Supply & Delivery." U.S. Department of Energy. 16 Feb. 2007. U.S.

Department of Energy. 22 Feb. 2007

<<http://www.fossil.energy.gov/programs/oilgas/>>.

Parker, Mark. Lecture. Carroll College, Helena, MT. 24 Jan. 2007.

"Population of Continents." Worldatlas.Com. 2007. 30 Mar. 2007

<<http://worldatlas.com/aatlas/infopage/continent.htm>>.

"President Bush Delivers State of the Union Address." The White House. 31 Jan. 2006.

The White House. 12 Jan. 2007

<<http://www.whitehouse.gov/news/releases/2006/01/20060131-10.html>>.

"Reflections." Bureau of Labor Statistics. Apr. 2004. U.S. Department of Labor. 21 Jan.

2007 <<http://www.bls.gov/opub/uscs/reflections.pdf>>.

"Report to Congressional Requesters." United States Government Accountability Office.

Dec. 2006. United States Government Accountability Office. 7 Mar. 2007

<<http://www.gao.gov/new.items/d07106.pdf>>.

"The Roots of the Crisis." PBS. 2005. PBS. 12 Feb. 2007

<<http://www.pbs.org/wgbh/pages/frontline/shows/blackout/themes/california.html>  
>.

The Smartest Guys in the Room. Dir. Alex Gibney. DVD. 2005.

"The World Factbook: United States." CIA - the World Factbook. 15 Mar. 2007. CIA. 30

Mar. 2007 <<https://www.cia.gov/cia/publications/factbook/print/us.html>>.

"Spot Market, Real-Time Market." Energy Dictionary. Energy Vortex. 22 Feb. 2007

<[http://www.energyvortex.com/energydictionary/spot\\_market\\_\\_real\\_time\\_market.html](http://www.energyvortex.com/energydictionary/spot_market__real_time_market.html)>.

"Stochastic." Def. 1. Dictionary.Com. 14 Jan. 2007

<<http://www.dictionary.com/stochastic>>.

"Summer Energy Conservation Tips." Riverside Public Utilities. 2007. Riverside Public

Utilities. 15 Jan. 2007 <<http://www.riversideca.gov/utilities/elec-summertips.asp>>.

Tran, Mark. "Enron -- Explained." Networkideas.Org. 22 Jan. 2002. International

Development Economics Associates. 12 Feb. 2007

<[http://www.networkideas.org/news/jan2002/news22\\_Enron\\_Whats%20\\_Enron.h](http://www.networkideas.org/news/jan2002/news22_Enron_Whats%20_Enron.htm)  
tm>.

"Transcript: Energy and the Role of Utilities." FocusWest. 11 Feb. 2007

<[http://focuswest.org/energy/trans\\_utilities.cfm](http://focuswest.org/energy/trans_utilities.cfm)>.

Utilities, Avista. Personal interview. Summer 2006.

"What Ferc Does." Federal Energy Regulatory Commission. 11 Aug. 2005. Federal

Energy Regulatory Commission. 12 Feb. 2007 <<http://www.ferc.gov/about/ferc-does.asp>>.

Wheelen, Thomas L., and J D. Hunger. Concepts in Strategic Management and Business Policy. 10th ed. Upper Saddle River, NJ: Pearson Prentice Hall, 2006. 5.

Wilson, Bethalee J. Lecture. Carroll College, Helena, MT. 22 Feb. 2007.

"Worldwide Energy Consumption - Current and Predicted." Time for Change. 2004. 24

Jan. 2007 <<http://timeforchange.org/prediction-of-energy-consumption>>.