

Restructuring the Electrical Industry

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Abstract

The primary focus of this report is to evaluate the restructuring of the electric utility industry here in Massachusetts. Specifically, we wish to know if, on the whole, Massachusetts electric consumers have benefited from the restructuring. By way of answering this question, we have researched the effect restructuring has had on the affordability of electricity, on the readiness of the infrastructure and on the potential for future growth. In addition, we also researched what went wrong in California in 2001, with the intent of predicting the likelihood of a similar crisis occurring in Massachusetts.

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Economic Effects	Bryan Shah
California Conclusions	Timothy Richardson
Massachusetts Conclusions	Christopher McCann
Economic Conclusions	Bryan Shah
Transmission Conclusions	Justin Odom
Government Conclusions	Justin Odom
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Introduction

The deregulation of the electrical industry has been a controversial topic that has been gathering momentum in many state legislatures over the past decade. Many states have passed laws and regulations on the electric generators and distributors within their jurisdictions. The deregulation of the industry has not been a smooth or streamlined process. There have been many ups and downs with some states fairing better than others.

This report contains a comprehensive analysis of two key states that have been severely impacted by the restructuring in the electrical industry, in either a positive or negative way. Massachusetts is an example of a state where deregulation was extremely effective. California is a state where deregulation began on a very rocky footing. There is an extensive examination of what activities took place that made restructuring in Massachusetts successful as well as an analysis of the activities that made restructuring in California very troublesome. The goal of this project is to provide the readers with the information required to be able to easily understand why deregulation was successful in some states such as Massachusetts and complete and utter chaos in others such as California.

The purpose of this IQP is to answer some of the questions that commonly arise when issues of deregulation are analyzed. Within this project we analyzed both ends of the spectrums, both the successes and failures. Only when information from both ends of the spectrum has been gathered can a true analysis of the feasibility of deregulation take place.

We believe that this project will provide an extremely valuable resource to those who are performing research in the area of electrical industry deregulation. There is an enormous amount of information on the topic of electric deregulation. Many states have

individual websites with the purpose of listing all the information and legislation that has been passed in their state relating to the topic. There are also many independent reports with information regarding this topic from individual contributors and analysts. Within this project, we provided a concise store of information gathered from various resources on the restructuring efforts in both Massachusetts and California.

There are several research methods used within this project. We chose to vary the research approaches for several reasons. We sought to obtain a broader range of information and also get reports from several different viewpoints which we felt would provide us with an unbiased analysis. For research methods we employed information from state government websites, individual analyst reports, past IQPs, as well as personal interviews with employees of electrical distribution and generation companies. One of the key contacts in the industry we interviewed was Robert McLaren, President of Massachusetts and New Hampshire operating companies with National Grid. Mr. McLaren was able to answer some of the logistic questions involved with restructuring as well as provide insight on some of the difficulties that were experienced by National Grid. Mr. McLaren was also able to provide us with policies and procedures as to why Massachusetts had successfully implemented deregulation and where other places in the country the techniques utilized in Massachusetts may be effectively employed.

State government websites have been an extremely useful source of information to form the baseline of the project. Because the sites are run individually by the states, they usually contain a wealth of information on legislative measures passed within the states relating to regulation.

There have been several individual reports written in the professional field that have proven to be quite useful in researching the topic. These types of sources were

extremely useful to us when preparing this paper as it allowed us some insight on deregulation through the eyes of the professional analysts. We chose to utilize case studies of both Massachusetts and California in order to provide some structured insight.

Another extremely important source of information for researching this project is past IQPs that have been done by students. By analyzing these past reports we are able to build off information that has been researched by past students. While not only allowing us to extend on past research this also allows us to avoid the “reinventing the wheel” effect.

With all these sources tied together, we hope that the final report will provide a unique, comprehensive analysis of issues that have occurred with deregulation, both positive and negative.

Restructuring Basics

Since its inception, the electric utility industry has been regulated by the federal and state governments. There are many reasons for this, such as the expense of wiring up “the grid” and ensuring that all citizens have access to electricity. In the wake of the Great Depression, the state governments began to not take control of most of the industry. Starting with the Public Utilities Holding Company Act of 1935, the federal government passed a number of laws regulating everything from profit caps to how much and where a utility’s assets could be invested. The generation, transmission, distribution and customer service aspects of an electric utility were generally all handled by one company that was given a monopoly franchise from the state governments and agreed to government oversight and regulation of their operations. This structure ensured stable prices and availability to electricity, so no one who needs electricity would be without it.

There has been a shift starting in the late 1970s and 1980s to de-regulate the electric industry, but it wasn’t until the mid-1990s before anything significant happened in the United States. Nationally, the primary motivating force behind this has been that the heavily-regulated industries’ emphasis on stability hindered innovation, leaving America dependant on foreign sources of power. In the wake of the Oil Embargo of the Arab-Israeli War in 1973, much of America gave consideration to plans to encourage the development of non-fossil fuel power generation. One of the more successful plans came out of California in 1976, when the state enacted legislation to aid private companies attempting to develop alternative, non-fossil fuel sources..

After California’s success, the federal government passed the National Energy Act of 1978 which included the Public Utility Regulatory Policies Act. This law

essentially expanded upon California's legislation by opening the market to generators using certain non-fossil fuel sources of power. Aside from that, very little was done on the restructuring front for nearly twenty years.

In the early 1990s, some areas, such as California and Massachusetts, the cost of electricity had skyrocketed to 30-50% the national average¹ and left the states scrambling for any way to lower prices. In 1994, California began to study the U.K.'s market structure with the intent on implementing its own restructuring.

The main objective of California's restructuring was to open up more of the industry to competition so as allowing consumers to choose who they buy their electricity from and thereby force generators and wholesalers to lower the price of electricity. To ensure that the existing utilities did not try to exclude newer, smaller generation companies, the state passed legislation forcing the existing transmission companies to allow all generators fair access to the grid. Also, to offset the "stranded" costs, or the one-time costs related to the design, construction, etc... of the power plant, the cost of electricity would be held at 110% of the 1996 price until the utilities had recouped their losses or until March 31st, 2002. After this freeze expired, the price of electricity would be determined by market forces.²

Once the price of electricity is determined by market forces, deregulation is guaranteed to provide some savings to the consumer, specifically, the cost of abiding by the regulations are no longer a part of the utility's operating expenses. After that, it should be the various and sundry market forces that determine the cost of electricity. Regardless of the structure of the industry, the price of electricity is primarily determined

¹ 1994 Electricity Report by the California Energy Commission. Published November 1995. Publication Number: P300-95-002

² William McNamara *The California Energy Crisis*. PenWell Corporation 2002.

by the cost of producing electricity, the cost of transmitting it from the producer to the consumer, the cost of maintaining the grid (repairing fallen lines, etc...) and the cost of dealing with the customer (billing, meter-reading, etc..). Like all businesses, electric utilities must make some profit in order to entice investors to invest in the utility, which determines the final cost of electricity.

Likewise, supply-and-demand plays a role in determining electric rates, as it does with the prices of everything else in the world. This applies both to retail and wholesale supply-and-demand. In an environment with many generators, wholesale rates will generally be lowered as generators compete with one another; ideally these savings would then be passed on to the consumer.

Unfortunately, small consumers do not have the same bargaining power that retailers and large consumers have, due to the difficulty involved for a single consumer to do the needed research and constantly get up-to-date information to ensure they are purchasing electricity from the cheapest provider. The fact that residential consumers of electricity are less likely to shop around for the best price reduces the likelihood of electricity wholesalers competing with one another and thus, passing on any saving to the customer. Further hindering residential consumers from getting the best possible value, if a consumer does switch providers, many utilities, such as Dominion Virginia Power, will add a “wires charge” to their former customer’s bill. Ostensibly, this is because the customer is still using the utility’s transmission lines and other infrastructure.³ It is arguable whether this charge is fairly set, or if it is purposefully kept high to ensure that

³ <http://neaap.ncat.org/news/va-bn.htm> “Deregulation Brings Profit But No Competition to Dominion Power” National Energy Affordability and Accessibility Project Last Updated: 11/25/2003

the competitor's rates plus the wires charge is greater than the existing electric utility's rates.

Another of restructuring's selling points is how it encourages the development of renewable and green energy sources. There is a problem with such energy sources; they are more expensive than the fossil fuels and nuclear power that are currently in use. In this way, the goal of expanding the use of green energy is in direct conflict with the goal of lowering prices to the consumer. On the other hand, green and renewable sources help reduce America's dependence on foreign sources of fossil fuels, making us less vulnerable to embargoes and supply shocks. There are also the indirect financial benefits of green energy, such as cleaner air resulting in fewer health problems.

However, there is the obvious increased probability of corruption in a less-regulated market. For example, the primary wholesaler in a state could charge retailers outrageous prices for electricity, knowing that the retailers must buy it in order to meet their demand. Likewise, because the state government forces the retailers to sell their electricity at a reasonable price, these retailers would end up taking tremendous losses and eventually file for bankruptcy. This would result in unreliable service, rolling blackouts and a host of other ills. Regrettably, the above example was not idle speculation, but quick summary of the causes of the 2001 Energy Crisis in California.

While most of these costs and losses are eliminated after restructuring, there are a whole host of other costs that replace them. First and foremost: because private companies are purchasing or building power generators, they start out at a loss, and must charge more in order to pay off the initial costs while making enough of a profit to attract investors. (Note: large enough companies may not have to do this, as the initial costs wouldn't significantly impact earnings.) Likewise, the cost of using different

technologies will result in research and development costs that will get passed on to the consumer. Ideally these two costs would only be temporary, until the company has repaid their debt. Whether or not that actually happens is debatable.

In addition, there is the obvious increased probability of corruption in a less-regulated market, as anti-corruption regulations are among those that are phased out. That there is no upper-limit on how much profit producers and wholesalers can make in many states and areas only increases the likelihood of corruption and exploitation of people's need for electricity. For example, many wholesalers could charge outrageous prices for the electricity knowing full well that retailers have no choice but to pay because they (the retailers) are still required by the government to buy electricity from them and sell it to consumers at a reasonable rate. Likewise, producers can purposely produce less electricity, driving up the price of the electricity. This is, regrettably, not idle speculation as California has shown. While California has had the worst experience vis-à-vis restructuring, it was hardly alone. In many other states, even though the ideal retailer is supposed to buy from the cheapest wholesaler, this doesn't always happen. Often retailers will buy from a parent or sister company that wholesales electricity, keeping the revenues within the family, so to speak. This lack of savings is then passed on to the consumer.⁴

Overall, there has been mixed results among those states that have experimented with restructuring. Most of the seventeen states that have restructured followed a scheme similar to the U.K.'s, although California went entirely in its own direction and, as previously mentioned, the industry there nearly collapsed after a few years. Thankfully, no other state has had similarly catastrophic results as of yet, though some states have

⁴ "Competitive Era Fails to Shrink Electric Bills" by David Cay Johnson.
<http://www.nytimes.com/2006/10/15/business/15utility.html?ei=5088&en=99e4faf2d8d0e8e2&ex=1318564800&pagewanted=all>

Published in the New York Times, Oct 15th, 2006

halted or reversed some of their restructuring due to the California debacle and due to reports of price/supply manipulation. As of this writing fourteen states are in the process of restructuring and are researching possible implementations for restructuring, but have not yet started. Thirteen states have decided to take no action towards restructuring. Three states, Nevada, New Mexico and Arkansas, have repealed parts of their partially implemented restructuring and two states, Montana and Oklahoma, have halted their restructuring for further consideration in light of recent developments. California has suspended its restructuring at least until the current flaws can be addressed, whether or not it continues at all is uncertain.⁵

⁵ “Restructuring Status of Electric Markets” Federal Energy Management Program
http://www1.eere.energy.gov/femp/program/utility/utilityman_staterestruc.html
Last updated 12/11/2006

Past IQPs

In our research we found three IQP that had some relevant information to the focus area of our project. They were the following:

- Restructuring Massachusetts' Electric Industry – 2006
- Electricity Generation, Distribution and Free Markets – 2004
- Deregulation of Electricity – 1999

Restructuring Massachusetts' Electric Industry

By: Andrew DeMarco, Adam Foley, David Greaves, Luke Leahy, James M. Phelan

As this IQP paper was the most recent of the three projects we chose to research, it contained it contained the most up to date information available in past projects.

The beginning of this project starts out with a description of the electrical industry as it is viewed by others. This research group analyzed why the electrical industry was monopoly driven in the first place. Their conclusions were that the service needed to be reliable and secure and a monopolistic architecture was the best way to accomplish that. The service was regulated by the governments and served as public utilities. In the early days of electrical power delivery there were many incompatible delivery methods and voltages. The electrical companies knew that they must overcome this obstacle to expand their practice.

Samuel Insull was one of the most important figures in accomplishing this goal. He knew that there must be enough equipment to handle the highest electrical loads. He was also a brilliant businessman that worked out best practices utilizing the full output of

the electrical generators at night and finding customers to use electricity during the day so that the generating capacity does not have to be increased.

It is obvious of why the electrical industry leaned towards monopolization in the first place, but history has also shown many of the downfalls of having a centrally controlled and powered electrical grid.

One of the most common known electrical issues that occurred was the Great New York Blackout of 1965. This caused many people to rethink the implementation of the power system, the generating capacity, as well as the overall setup in general. Regulators worked feverishly to insure that this event would not happen again but the damage had already occurred. The energy crisis that occurred during the 1970's also had a great effect on people's opinion of the electrical industry.

The answer to this monopolistic single point of failure was the deregulation of the industry allowing competitors to enter the market. Competition forces the electrical generators to a more diverse market encouraging competition among prices. This allowed the consumer to choose their electrical supplier based on which rates were the cheapest for their usage. This increased competition within the industry was not without a cost though.

Renewable resources played a major role in the deregulation of the industry. People were getting tired of the variable price of power based on the fluctuating costs of natural resources. People who utilized renewable energy for their homes wanted to be able to profit from the power they were not using that was being generated. This is how independent generators imputing into the power grid was born.

This IQP group concluded that the primary aim of restructuring the electrical industry was to enable consumers to take advantage of a market regulated electrical

industry, not one whose prices are set by a regulatory board. One hundred years ago, the deregulation of the industry would not have been a possibility. Technology was not advanced enough to track the power going into the grid and monitor all the information that was required to insure that the appropriate producers get paid for their power. It was much more logical at the time to allow a single producer to take control of a specific area and be responsible for all power generation in the general vicinity. By taking away the central control of the industry, the price setting was no longer dependent on the regulatory board of a state but on the effect of supply and demand in the market; the true spirit of capitalism.⁶

Electricity Generation, Distribution and Free Markets

The main focus of this particular IQP appears to be how deregulation came about and the reasons for it.

The first section of the paper is an analysis of the fragility of fossil fuels and the limited role that they will play in our distant future. There is also an analysis of the plausibility of using nuclear power as the power source of the future. This however comes with many pitfalls, there been several major issues with nuclear plants in the past and this has tainted people's opinion towards them.

The IQP also went into depth on all the current forms of renewable energy (at the time of writing). Renewable energy is what put the deregulation movement into full swing. For example, the implementation of harnessing solar energy allows any consumer

⁶ Demarco, Foley, Greaves, Leay, Phelan. Restructuring Massachusetts' Electric Industry. (May 2, 2006)

to purchase solar panels and set them up on their property. They then wanted to sell back the energy that was not used, therefore the push for deregulation had begun.⁷

The IQP then went on to describe the structure of the electric energy industry today. The author discussed the breakdown of where the electricity came from. The statistics presented showed that over 65% of the electricity being purchased in the United States was distributed from investor-owned utilities. The path that some states are choosing to walk down is one that includes deregulation. The IQP describes the phone companies' deregulation of the 1980's to draw comparisons to the deregulation of electricity. What happened to the phone companies' in the 80's was that AT&T had a large percentage of the market share over the price of long-distance services throughout the entire country. The government decided that if it divided up AT&T that free market competition would drive the prices of phone service way down. This was the basis for some of the decisions states have made when regarding the deregulation of the electric energy industry. The reason that the idea got overlooked previously is that many thought it ridiculous that every distributor would have to run their own network of power lines everywhere.

There is a new take on how to accomplish distribution of electricity in a free market fashion. This new take involves having one company distribute the electricity and let the generation of electricity be open to the free market. In some locations this has allowed customers to be able to choose the electric producer of their choice.

A form of competition that also exists is the competition for generation among the various generation companies to the distributors. The generation companies give bids of

⁷ Kashef, Bahman E. *Electricity Generation, Distribution and Free Markets.*(June 1st, 2004)

what they will sell the electricity for. The distribution company receives those bids and decides which bids to accept based on a number of factors.

The author then went on to discuss the electric problems that California experienced, along with the problems that Enron caused. California experienced many electrical issues around the year 2000. Enron was one of the major perpetrators in California's electric issues at the time. The issues include, high prices, along with the congestion of the power grid which led to brownouts and blackouts in California.

Deregulation of Electricity

This IQP is the oldest of the ones we chose to incorporate into our report. It does however provide a valuable analysis of the roots of deregulation on a federal level as well as on an international level.

Unlike the other IQP projects, this project analyzed the act of deregulation that has occurred in the United Kingdom. The United Kingdom was one of the first countries to migrate its electrical industry over to the private sector. With the passage of the Electricity Act of 1983, any company is permitted to provide power into the power grid.

The authors discuss how the United States federal government decided to deregulate after the United Kingdom did. The United Kingdom had positive results related to deregulation. The success of deregulation in the United Kingdom rested on the electric energy industry becoming more efficient. There was one drawback to the rise in efficiency that the United Kingdom experienced. The electric industry's workforce was cut by almost 50 percent. The deregulation is not at fault for getting rid of the jobs, it is mainly the government's fault for hiring unneeded workers. During the United States'

further progress in deregulation and restructuring, these workforce issues will have to be addressed.

The federal government changed some of its electric energy policies to open the country up for deregulation but has left the progress of deregulation up to the states to decide. This allows for the states to go at their own pace and figure out a plan that fits the needs of the particular state and region, such as the variable cost of living and availability of renewable resources.

Stranded costs have become a major issue in restructuring. For restructuring to become successful stranded costs must be fully recoverable for full competition. An inability for incumbent utilities to recover stranded costs will put them at a disadvantage not creating a viable market for others to enter, therefore causing many issues that could be prevented in the restructuring effort. Massachusetts approved a law making all stranded costs 100 percent recoverable. The stranded costs are recoverable over a long period of time, 5-10 years.

The author of this IQP concluded that deregulation will be beneficial to all in the long run. Short term losses will be incurred, such as immediate job cuts and no reduction of cost to residential consumers in the short term. As more electric generation companies grow in power there will be more need for the more efficiency as competition rises.

The project also looks at the deregulation of Massachusetts but in one of its much earlier forms. It analyzes the deregulation of the generation component, one of the four major components of electrical power.

This IQP was useful to us to provide us information on the international efforts of deregulation as well as the early stages of deregulation in Massachusetts and California.

We can use these past IQP projects to create a timeline of research starting with the beginnings of deregulation within Massachusetts and California up to the state that they have reached today.⁸

⁸ McCarthy, Matthew; Minka, Stephen; Parsons, Trevor. *Deregulation of Electricity*. (May 28th, 2006)

Cases of Restructuring

The Deregulation of California

California was a pioneer among states in the U.S. regarding the deregulation of electricity. One of the main reasons for this desire to deregulate the industry was an increase in electric rates in the state. It was viewed by a portion of the population that electric rates would be much lower if competition was introduced into the electric energy market. This growing sentiment was the foundation which the California deregulation movement was built from.

The National Energy Policy Act of 1992 opened the door for states to deregulate their energy industry. The main reason for this is the National Energy Policy Act allowed for transmission grid access to independent power producers. This access ushered in new possibilities.

California's first substantial move towards deregulation occurred in 1993. The California Public Utilities Commission (CPUC) sent representatives to the United Kingdom. The United Kingdom had already gone through a bout with electric deregulation, and the CPUC wanted to observe the electric power privatization model that the United Kingdom had followed. This trip led the CPUC to issue a policy statement in February of 1993 entitled, *California's Electric Services Industry: Perspectives on the Past, Strategies for the Future*, this policy statement is commonly

referred to as the “yellow book”. The policy proposal reviewed many of the policy issues facing California in regards to electric energy.⁹

In April of 1994, the CPUC released a proposal that became known as the “Blue Book”. This proposal detailed California’s intention to restructure the electric utilities and open up a competitive market in the field of electric generation. An important aspect of the Blue Book was the separation of generation of electricity from the transmission and distribution of it. This principal is also known as vertical disintegration.¹⁰

In December of 1995 the CPUC issued another statement regarding the deregulation of the electric energy industry. This statement outlined three major things. Firstly, the CPUC outlined a “phase in period” for restructuring. This period was set to begin on January 1, 1998 and be completed by 2003. This phase in of restructuring was a period in which the people and businesses of California were migrated over to a restructured electric industry in which the people could choose the source of their electricity, or choose to keep their incumbent utility. Secondly, the CPUC facilitated the creation of the Independent System Operator (ISO). The California ISO, originally called PoolCO, ensured that power generators had equal access to the state’s power grid. Thirdly, the 1995 proposal by the CPUC called for the creation of the power exchange. The power exchange was basically a hub for the buying and selling of electricity. Also, all California investor owned utilities (IOUs) were required to purchase electricity from the Power Exchange. For all other buyers and sellers of electricity, involvement in the power exchange was optional. The fact that the IOUs accounted for 70% of the market in California pushed most other buyers and sellers to be involved with the power exchange.

⁹ McNamara, Will. The California Energy Crisis: Lessons for a Deregulating Industry. Tulsa, OK: Penwell Corporation, 2002.

¹⁰ McNamara, Will. The California Energy Crisis: Lessons for a Deregulating Industry. Tulsa, OK: Penwell Corporation, 2002.

The power exchange controlled the price of electricity based on supply and demand; these prices were updated on an hourly basis.¹¹

California Assembly Bill 1890 (AB 1890) represented the first piece of legislation regarding the restructuring of the electric energy industry in California. AB 1890 was passed by California's legislature and signed by Governor Pete Wilson in September of 1996. AB 1890 declared that the generation of electricity would be open to competition but the transmission and distribution would still be regulated. Other points laid out in AB 1890 were, the recouping of stranded costs for utilities, a rate cap that would be in effect until at least March, 2001, formal acceptance of the proposal known as the blue book, which established both the California ISO and the power exchange. A rate freeze was established for regulated IOU rates. This freeze was to stay in place until the stranded costs of the IOU were recovered.¹²

During the two years between the passing of AB 1890 and the date set for deregulation to start, 1996 to 1998, the details were finalized for direct access. This gap caused a period of uncertainty. Investors were not certain exactly how the legislation would be implemented. This uncertainty caused investors to be tentative and hesitant to invest in new generation facilities until it was clear how AB 1890 would be implemented. The incumbent utilities divested their generation facilities to unregulated companies. These companies would sell electricity back to the California power exchange. The reason that the companies that bought the generation facilities, along with other independent generators of electricity, would sell the electricity produced to the power exchange was that the incumbent utilities could only buy electricity from the power

¹¹ McNamara, Will. The California Energy Crisis: Lessons for a Deregulating Industry. Tulsa, OK: Penwell Corporation, 2002.

¹² McNamara, Will. The California Energy Crisis: Lessons for a Deregulating Industry. Tulsa, OK: Penwell Corporation, 2002.

exchange and these companies accounted for 70% of the transmission to electric customers in the state of California. Therefore if the generators wanted their electricity to get purchased, they were basically forced to sell it to the power exchange.¹³

The retail electricity plans did not go as planned for California. First off the start date for direct access in California as laid out in AB 1890 was delayed from January 1, 1998 to March 31, 1998. Secondly the initiative of California residents to choose their own power supplier was not as high as anticipated. Despite money spent on educating the residents of their options to decide where their electricity came from, only 3-4% of the 70% of customers of the IOUs were participating in the retail electricity market as of May 1, 1999. This was a decline from the initial number of 5% at the introduction of direct access. In this statistic 1% of residential customers were choosing to exercise their ability to choose where their electricity was coming from, while 15% of industrial customers exercised their right.¹⁴

The energy crisis that eventually occurred in California had some fundamental reasons behind it. Firstly, the generation of power did not keep up with the demand of the electric customers. California's electricity usage steadily increased by significant amounts from 1997 to 2000. Electricity production in the state did not keep pace with this growth in usage. Between 1990 and 1999 generation capacity decreased 2%, during which time the sale of electricity rose 11%.¹⁵ Imported power from other states also decreased, and contributed to California's electricity crisis. The reasons for this drop in contribution from other states can be attributed to two major issues. One issue was that

¹³ McNamara, Will. The California Energy Crisis: Lessons for a Deregulating Industry. Tulsa, OK: Penwell Corporation, 2002.

¹⁴ McNamara, Will. The California Energy Crisis: Lessons for a Deregulating Industry. Tulsa, OK: Penwell Corporation, 2002.

¹⁵ McNamara, Will. The California Energy Crisis: Lessons for a Deregulating Industry. Tulsa, OK: Penwell Corporation, 2002.

the demand in other states was also increasing allowing for less electricity to be sold off because the state itself was using more. Secondly, weather also played a part in the lack of excess electricity. The northwest generally represented a significant portion of out of state power for California. This region experienced a distinct lack of rain and snow over this period of time. This drought in the northwest caused a lack of flow in the rivers that flowed into the hydro-electric plants in the region slowing electricity production.¹⁶

Another factor contributing to the energy crisis in California was that a number of generation facilities in California were taken offline around the year 2000. These generation facilities were either undergoing routine maintenance or were experiencing system problems. Also, some plants were required to shut down because of increased emission issues. Over the course of the year 2000 some 10 gigawatts were taken offline. There were times during this year when up to 25% of the generation capacity of the state of California was offline.¹⁷

The significant increase in wholesale power costs also contributed to the energy crisis in California. One reason for this increase in power costs was the increase in cost of natural gas. Over the course of the 1990's the cost of natural gas went up significantly. This increase greatly affected California because many of its power plants use natural gas to produce electricity. Also, increased emissions standards also required generation facilities to purchase large upgrades. These upgrades forced the generation facilities to sell their electricity at an increased rate to make up for the increased cost to production. The increase in wholesale electricity prices made an even bigger impact

¹⁶ McNamara, Will. The California Energy Crisis: Lessons for a Deregulating Industry. Tulsa, OK: Penwell Corporation, 2002.

¹⁷ McNamara, Will. The California Energy Crisis: Lessons for a Deregulating Industry. Tulsa, OK: Penwell Corporation, 2002.

during this time period than it would have if the prices rose during a different period. This increased impact was due to the rate cap that was imposed by AB 1890.¹⁸

Any single one of these factors, as interrupting as they may have been on their own, would not have caused a widespread problem in California. This fact that all of these issues arose in the same timeframe compounded all of the negatives into a detrimental effect on electric energy industry of California, as well as effecting the electric customers of California, residential, commercial, and industrial.

The summer of 2000 in California saw both increased wholesale electricity prices along with increased strain on the state's power grid. The increased strain on the power grid saw the rise in energy emergencies. In California there are three stages of energy emergency. A Stage 1 emergency is when the electric operating reserves are forecasted to be less than 7%. A Stage 2 emergency is when the electric operating reserves are forecasted to be less than 5%. The final alert, the Stage 3 emergency is when the electric operating reserves are forecasted to be at less than 1.5%.¹⁹ The first stage 2 emergency of the California energy crisis occurred on May 22, 2000, which was a resultant of a very hot day causing increased strain on the power grid.²⁰

As the summer progressed even further, prices of wholesale electricity reached unprecedented levels, along with increased frequency of energy emergencies. These energy emergencies caused rolling blackouts to occur in some areas of the state. As

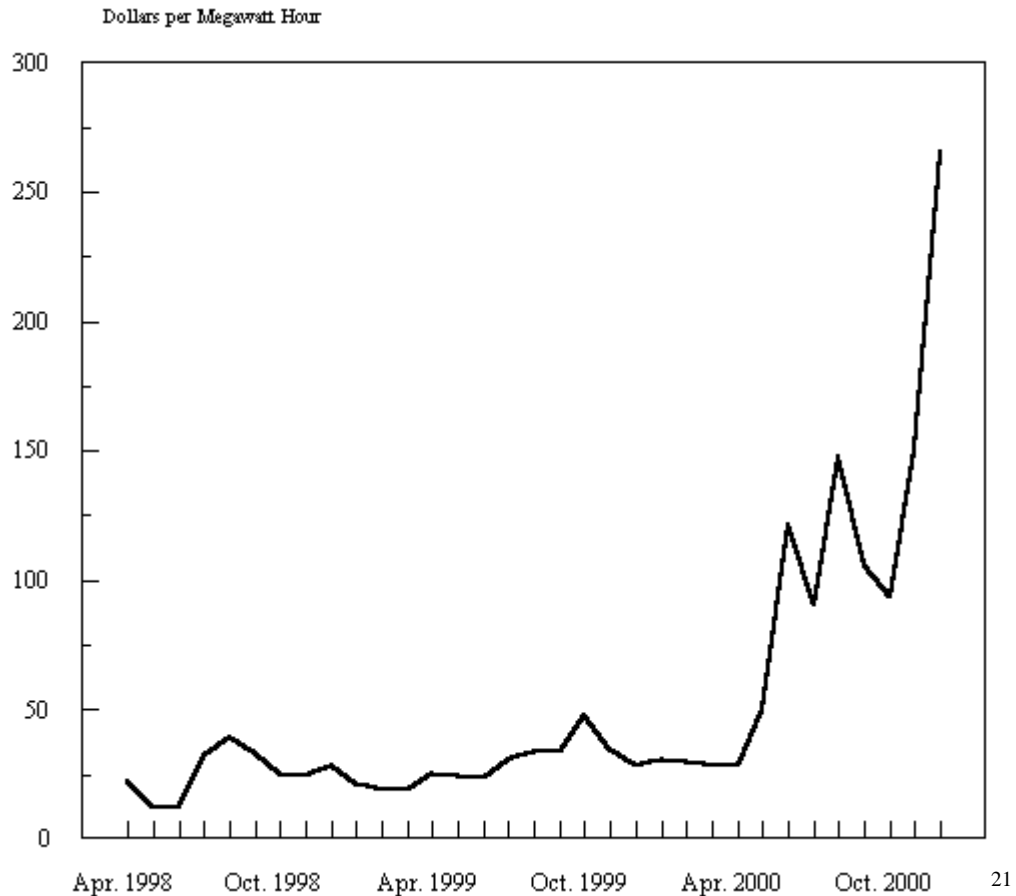
¹⁸ McNamara, Will. The California Energy Crisis: Lessons for a Deregulating Industry. Tulsa, OK: Penwell Corporation, 2002.

¹⁹ Department of General Services, California, "Electrical Emergency Procedures21.pdf. "<http://www.documents.dgs.ca.gov/energy/Electrical%20Emergency%20Procedures21.pdf> Internet; accessed March 26, 2007.

²⁰ PBS, Frontline: blackout: California: timeline." "<http://www.pbs.org/wgbh/pages/frontline/shows/blackout/california/timeline.html> Internet; accessed April 5, 2007.

shown in the figure below, the price of electricity per Megawatt hour rose astronomically over the summer and fall of the year 2000 from where it had been previously.

**AVERAGE PRICES THAT UTILITIES PAID FOR ELECTRICITY IN THE CALIFORNIA
POWER EXCHANGE'S DAY-AHEAD AUCTIONS, APRIL 1998 THROUGH DECEMBER 2000**



The astronomical increase in wholesale electricity price was compounded by another issue. The retail price of electricity had been capped earlier in the restructuring process. These caps did not allow the utilities to raise their rates to coincide with the huge leap in wholesale electricity costs that were being incurred. The initial intention of the price cap on retail prices was to create a price floor. The costs of wholesale electricity was expected to drop with the introduction of competition to the market, and capping retail prices would allow for the utilities to recover their stranded costs once the price of wholesale electricity dropped. The problem with this was that when the price of wholesale electricity rose dramatically instead of falling, the price cap acted as a price

²¹ Dan L. Crippen. "Causes and Lessons of the California Electricity Crisis." September 2001. <http://www.cbo.gov/showdoc.cfm?index=3062&sequence=0> . Internet; accessed April 5, 2007.

ceiling for electricity instead of a floor. The utilities were forced to purchase the wholesale electricity at the immensely elevated prices and sell to their customers at the now anemic capped retail prices.²² The large gap between the prices the utilities were buying and selling electricity at caused the utilities to put themselves in poor financial situations.

In late July 2000 the Public Utility Commission ordered an investigation into what was affecting the pricing and reliability of electrical service in the state. The investigation was to report back to the Commission by November 1, 2000. The investigation found that the market structure and rules for wholesale of electricity were fundamentally flawed. The structure allowed for short-term unreasonable electric rates. The Commission proposed remedies to the situation.²³

As the end of the year 2000 approaches, California's energy issues were not improving at all. On December 7, 2000, the first statewide stage 3 energy emergency was declared when the power reserves dipped due to low supply. Rolling blackouts were avoided when the state shut down two large federal and state water pumps.²⁴

California, as well as the Federal Energy Regulatory Commission, FERC, established and suggested ways to help bring the California out of the energy crisis that the state was in. California removed the requirement of the public utilities to purchase solely from the power exchange, and encouraged the utilities to enter into long term contracts so that they would not have to rely on the spot market. FERC established a

²² Dan L. Crippen. "Causes and Lessons of the California Electricity Crisis." September 2001. <http://www.cbo.gov/showdoc.cfm?index=3062&sequence=0> . Internet; accessed April 5, 2007.

²³ FERC, "The Western Energy Crisis, the Enron Bankruptcy and FERC's Response." <http://www.ferc.gov/industries/electric/indus-act/wec/chron/chronology.pdf> . Internet; accessed April 5, 2007.

²⁴ PBS, "Frontline: blackout: California: timeline." <http://www.pbs.org/wgbh/pages/frontline/shows/blackout/california/timeline.html> Internet; accessed April 5, 2007.

\$150 per Megawatt hour, MWh, breakpoint which was in effect from January 1, 2001 to May 1, 2001. Any sellers who made bids above the breakpoint were required to explain themselves in a weekly report with the commission.²⁵

The utilities encountered a problem when they were encouraged to purchase long term contracts for electricity. The events up to that point had put them in an unfavorable situation as far as credit goes. Due to this situation, the utilities, mainly Pacific Gas and Electric, PG&E and Southern California Edison, SCE, needed to have a creditworthy backer to help them purchase long term contracts. The California Department of Water Resources was the one who provided the backing needed.²⁶

In March of 2001, the Commission looked for ways to increase energy supply in California. The Commission broadened regulatory waivers for facilities under the Public Utility Regulatory Policies Act of 1978, or PURPA. The Commission also expedited the certification of new natural gas pipelines, and looked into potentially increasing the generation capacity of other generation facilities in the region.²⁷

In March of 2001, the California Public Utilities Commission approved a rate increase to retail rates to try and bridge the gap between the price of whole sale electricity and retail electricity. Despite this raise in retail prices, on April 6, 2001 Pacific Gas and Electric filed for Chapter 11 Bankruptcy.²⁸

²⁵ FERC, "The Western Energy Crisis, the Enron Bankruptcy and FERC's Response." <http://www.ferc.gov/industries/electric/indus-act/wec/chron/chronology.pdf> . Internet; accessed April 5,2007.

²⁶FERC, "The Western Energy Crisis, the Enron Bankruptcy and FERC's Response." <http://www.ferc.gov/industries/electric/indus-act/wec/chron/chronology.pdf> . Internet; accessed April 5,2007.

²⁷FERC, "The Western Energy Crisis, the Enron Bankruptcy and FERC's Response." <http://www.ferc.gov/industries/electric/indus-act/wec/chron/chronology.pdf> . Internet; accessed April 5,2007.

²⁸ PBS, "Frontline: blackout: California: timeline." <http://www.pbs.org/wgbh/pages/frontline/shows/blackout/california/timeline.html> Internet; accessed April 5, 2007.

From April of 2001 into the summer of that same year FERC pushed forward a mitigation and monitoring program that had been developed in the months prior. This program laid out measures for continuing to stabilize the California energy market.²⁹

After the energy crisis was over, many companies who sold wholesale electricity in California during that time period were accused of tampering with the prices of this wholesale electricity. One of the major companies to be accused of doing so was Texas based Enron. Enron eventually went bankrupt after this, and agreed to a large settlement with a group of California agencies and public utilities, that because of the company's bankruptcy was never expected to be paid in full. The actions of companies such as Enron only fueled the fire of the energy crisis in California.³⁰

California eventually stemmed the flow of the electric energy crisis. There were many contributing factors to the crisis that stopped and regressed the progress of deregulation in California. It is hard to say if any of these issues had not taken place, whether the crisis would have been lessened, or whether the deregulation in California might have been more successful. There are several things about the way California went about the deregulation of their electric industry that may have contributed to its eventual downfall. Firstly, the legislation that California put into place did not allow for much room for change after it was voted in and signed by the state governing bodies, and was also gone about rather swiftly. If this legislation had allowed for more flexible retail prices, or more generation incentives or something similar, California may have been able to adjust what was happening instead of trying to ride it out and things spiraling out

²⁹ FERC, "The Western Energy Crisis, the Enron Bankruptcy and FERC's Response." <http://www.ferc.gov/industries/electric/indus-act/wec/chron/chronology.pdf> . Internet; accessed April 5, 2007.

³⁰ Wikipedia, "California electricity crisis." http://en.wikipedia.org/wiki/California_electricity_crisis . Internet; accessed April 12, 2007.

of control. Secondly, if the legislation had taken into account the possible increase in generation need, and spelled out how this need could be met there may have been different results. Thirdly, the state could have implemented some sort of wholesale and retail price monitoring effort, as was introduced towards the end of the energy crisis, earlier so that companies such as Enron could not take advantage of the California energy market the way they did. Overall California was not successful in their attempt to deregulate their electric energy industry. There were many factors that contributed to its downfall, some of which could have possibly been controlled. It is these factors that could possibly have been controlled that may hold up as an example to those states that may try to deregulate or restructure in the future.

Massachusetts Case Study

Legislation

On November 25, 1997 the Electric Utility Restructuring Act³¹ was passed in Massachusetts beginning the deregulation process of the electric industry. This plan put into place the goal of a seven year transition period for restructuring the electrical industry. The major goals of the act were to make a plan for the restructuring of the electric utility industry that would lead to initial consumer rate savings by March 1, 1998 that would continue into the future as well as strengthen the industry.

The major new aspect introduced in the act that would lead to savings was the introduction of competition. Previous to the restructuring act, public electric companies had provided service to territories at regulated rates. The act gave consumers the right to

³¹Massachusetts Government, "Chapter 164 of The Acts of 1997" November 1997 [internet] Available From: <http://www.mass.gov/legis/laws/seslaw97/sl970164.htm> (Accessed 4/10/07)

choose their provider and some of the services that they would receive. The opportunity for new producers to enter the market was also more plausible under the new act and therefore there were more producers of electricity that created more competition. The act established the idea that competition should keep electric rates down as well as increase the consumers' confidence in the reliability of the industry.

The restructuring act called for an increase in the reliability of interconnected regional transmission systems. One contribution to achieving this goal was continuing to have a supply of electric generation that could meet the demands of the state as they continue to grow. The act called for all utilities to sell off their power plants and any other means of generating power that they possessed, forcing them to serve solely as distributors. This meant that both generators and distributors would have less influence on the market than prior to the act which would help the consumer by spreading out the control in the industry to more parties. The act also called for Massachusetts to look to work with the other New England states as well as New York to improve the regional transmission systems' reliability.

Another major goal of the restructuring act was to force the electrical industry to have a less negative effect on the environment. The restructuring act called for conservation policies to be funded and carried out. With the act it was believed that other sources of generation would arise to enter the competitive market and that some of these generators would be more environmentally sound than those that currently existed in the market. Education was also established as an important tool to achieving this goal. If the consumer knew more about the electrical industry then the consumer could make choices that would not only benefit them economically but also environmentally.

The initial costs that were to arise from the deregulation process were seen to be a small problem that could easily be overcome and would be worth it in the long run. These costs could be recovered over a certain amount of time rather than immediately. The main purpose in delaying the recovery of the costs of the transition was so that the rates of the electric consumers would not increase. There were also incentives put into the act to protect the electric companies as well as their employees from some of the negative results that the deregulation might lead to such as unemployment.

Price Caps

The main goal in the deregulation of the electrical industry in Massachusetts was to lower rates to the consumer. The introduction of competition to the market was supposed to be the main factor in achieving this goal but there needed to be a safety net. With the switch from a regulated industry to a deregulated industry came the opportunity for generators to set their own rates for electricity. The goal of the restructuring was for generators to compete with each other to offer lower rates to the consumer but also allowed for the possibility of an oligopoly to be formed between the generators. If an oligopoly was formed, the generators could all agree to have very high rates and the transmitters would be forced to buy electricity at these rates without being able to immediately raise their own rates which could lead to bankruptcy. To prevent this scenario from ever happening, a temporary price cap was put into place that would keep the retailers from raising rates above the established cap until it was lifted.

The price caps were also set up to directly protect the consumer. It was a fact that the restructuring of the electrical utilities industry was going to cost the utilities a great deal. The price caps kept companies from trying to recover all of their costs immediately

by greatly increasing costs to the consumer. These caps also had a negative impact on the industry in that they discouraged some new generators from entering the industry for fear of not being able to recover their initial investments. The Massachusetts price cap was set to one thousand dollars per megawatt-hour³² which allowed retailers enough space to react to the generators prices.

ISO-New England

In New England Massachusetts was not the only state that went through the process of restructuring its electrical industry. Vermont was the only state that did not deregulate any of its industry. In the process of restructuring over New England from 1997 to 2005, the number of generating companies increased from fifteen to thirty-five with none of these controlling more than fifteen percent of the region's generating capacity². With generators spread out all over the region and most of them no longer regulated, it was necessary for a body to be formed to oversee the region's electric industry. All over the country Independent System Operators were being formed and thus in 1997 the non-profit organization ISO-New England was formed to watch over the New England region's electric industry.

ISO-New England's main responsibility is ensuring the constant availability of electricity to all areas in New England. ISO New England does this by: "ensuring the day-to-day reliable operation of New England's bulk power generation and transmission system, by overseeing and ensuring the fair administration of the region's wholesale

³²The Aim Foundation, "Electrical Industry Restructuring in Massachusetts: Progress in achieving the goals of the Restructuring Act." December 2005 [Internet] Available From: <http://www.aimnet.org/AM/TemplateRedirect.cfm?template=/CM/ContentDisplay.cfm&ContentID=9120> (accessed 11/19/2006)

electricity markets, and by managing comprehensive, regional planning processes.”³³

With the demand for electricity differing from area to area throughout New England it is essential that the electricity can get from the generators in low demand areas, to the high demand areas. ISO-New England helps to keep all of the New England states’ interconnected transmission lines running smoothly.

Before the deregulation process, electricity was produced and sold to consumers that were simply in the generators’ pools which had been established several decades ago. Shortly after the deregulation process began ISO-New England helped to establish interim markets where the consumers would begin to have a choice in who they would purchase their electricity from. Although these markets were not fully functional, they were a step in the direction of introducing competition to the electric industry. With these new markets forming came a great deal of support from investors. Investors started to see the potential in the electric generation and started to put money into developing new and efficient power plants. These new plants drew attention to the infrastructure and problems with old transmission systems that needed to be addressed. So the introduction of these interim markets was another way that ISO-New England helped to improve the reliability of the electric industry.³⁴

Influence of Resources

Most electric generation involves using a natural resource to produce energy and then converting that energy into electricity. Since the electric generation relies heavily on

³³ISO New England, “About ISO-NE” April 2005 [Internet] Available From: <http://www.iso-ne.com/aboutiso/index.html> (Accessed 11/19/2006)

³⁴ ISO New England, “Progress of New England’s Restructured Electric Industry and Competitive Markets: The Benefits of ISO’s and RTO’s.” April 2005 [Internet] Available From: http://www.iso-ne.com/pubs/whtpprs/rto_paper.pdf (Accessed 11/19/2006)

natural resources, electric rates must also rely heavily on the availability and prices of these natural resources. Although one of the goals of restructuring was to increase the use of alternative energies such as wind and solar power, the availability of reliable sources of these is very low in Massachusetts and the cost is high. Thus the Massachusetts electrical industry is forced to rely mainly on 3 natural resources: coal, natural gas, and petroleum.

Coal has always played a major role in the generation of electricity. The major benefit of using coal in power plants is that it was the first major natural resource and therefore most older plants are set up for the use of coal and therefore will use coal to avoid the cost of transitioning to newer technologies. The contribution of coal to the electrical industry increased slightly after the restructuring process began which could possibly be due to an increase in demand but has remained between 4.3 million and 5 million short tons per year from 1997 to 2005.³⁵ The price of coal decreased continually from 1997 to 2003 and then started to rise again but it seems that cost did not play a large role in the amount of coal that was used for electric generation.³⁶

Natural gas creates a very large amount of energy when burned and it therefore has taken a much more prominent role in the electric industry in the past few decades. The major benefits of natural gas are the facts that it is much easier to transport than coal and its reaction produces less harmful waste. The major downside to natural gas is that its supply is limited and its cost tends to fluctuate a large amount. The contribution of natural gas to the electric industry was steadily increasing up to approximately 160

³⁵ Energy Information Administration, "State by State Consumption of Energy Sources" January 2006 [internet] Available From: http://www.eia.doe.gov/cneaf/electricity/epa/consumption_state.xls (Accessed 4/10/07)

³⁶Energy Information Administration, "Annual Energy Review 2005-'Table 7.8 Coal Prices'." January 2006 [internet] Available From: http://www.eia.doe.gov/emeu/aer/pdf/pages/sec7_19.pdf (Accessed 4/10/07)

million MCF (thousand cubic feet) at the start of the restructuring process and then started to decline until 2001 where it started to rise dramatically before leveling off in 2003 at approximately 160 million MCF.³⁷ In the United States the price of natural gas, although fluctuating, remained in the range of \$2.00 to \$2.60 per MCF in the early from 1985 to 1995. In 1996 the price jumped up to approximately \$2.80 per MCF, leveled off through 1999 and then jumped almost \$2.00 in 2000 before decreasing slightly and then beginning to climb again.³⁸ The use of natural gas in the electric industry can be seen to vary almost directly with its cost. The fact that the contribution of natural gas to the electric industry did sometimes increase even with higher prices shows that the demand of electricity was increasing and that demand had to be met.

Petroleum has many of the same benefits as natural gas with the main exception being that it produces more harmful waste, but still less than coal. Petroleum also has a relative abundance making it a very important source of energy since the 1950s. The contribution of petroleum to the electric industry in the US was steadily decreasing in the early 1990s until it leveled off in 1995 at just over 10 million barrels per year. When the restructuring process began the contribution of petroleum jumped over a 2 year period to over 23 million barrels per year and then started to steadily decrease.⁵ In the early 1990s the price of oil hovered around \$20.00 per barrel but than dropped dramatically to just under \$13.00 per barrel in 1998 (which explains the increase in contribution of petroleum

³⁷ Energy Information Administration, "State by State Consumption of Energy Sources" January 2006 [internet] Available From: http://www.eia.doe.gov/cneaf/electricity/epa/consumption_state.xls (Accessed 4/10/07)

³⁸ Energy Information Administration, "Annual Energy Review 2005-'Table 6.8 'Natural Gas Prices by Sector.'" January 2006 [internet] Available From: http://www.eia.doe.gov/emeu/aer/pdf/pages/sec6_19.pdf (Accessed 4/10/07)

to the electrical industry that year) before it started to increase again.³⁹ As is the case with natural gas, it is clear that the contribution of petroleum in the electrical industry fluctuates depending on its market price.

It is clear from the above information that the cost of natural resources plays a major role in which of these resources are used. The contribution of coal to the electric industry is near steady and does not fluctuate a great deal with its price. On the other hand, the contributions of natural gas and petroleum rely heavily on not only their own price but also on the others. During periods where natural gas contribution is low, the contribution of petroleum is high and vice versa. Therefore it is easy to see that the change in prices of these natural resources have a major impact on rates in the electric industry.

Renewable Resources

The Electric Utility Restructuring Act did not only focus on lowering costs for the consumer but also tried to clean up the industry. Concern for the impact of pollution, produced by the electric industry, on the environment has continued to grow over the years as we continue to learn of the negative effects it will have. For this reason the restructuring act called for the Massachusetts electric industry to look into, and eventually start to use, renewable resources. The restructuring act called for 1 percent contribution of renewable energies starting in 2003 increasing a half percent each year before increasing a full percent from 2009 to 2010.⁴⁰

³⁹ Energy Information Administration, "Monthly Energy Review March 2007- 'Table 9.1 'Crude Oil Price Summary.'" March 2007 [internet] Available From: http://www.eia.doe.gov/emeu/mer/pdf/pages/sec9_3.pdf (Accessed 4/10/07)

⁴⁰ NCSL Legislative Wind Institute, "Renewable Portfolio Standard Renewable Energy Credits: Creating Markets For Clean Power" June 2005 [internet] Available From: <http://www.raponline.org/Slides/RS-NCSLwind-6-05.pdf> (Accessed 4/10/07)

When generating electricity using natural resources such as coal, natural gas, and petroleum, there are also several hazardous byproducts such as “green house” gases which have been shown to deplete the ozone layer. When using renewable resources to generate electricity, the pollution is cut down considerably. The major types of renewable energy include: wind power, water power, solar power, fuel cells, and geothermal energy. Massachusetts location and climate limit it from taking full advantage of some of these renewable energies such as solar power. The technology on some of these energies such as fuel cells is still not fully developed meaning that they can not be used on a large scale yet. The type of renewable energy that is most compatible with the New England region is wind power. As is the case with any new technology, it takes a long time to set up and get approval from lawmakers before it can be used.

The major drawback to renewable energy is its high cost. The natural resources previously discussed are used due to their availability and the ease of generating electricity from them. When introducing a renewable energy as a source of electrical generation, there are usually high costs involved due to factors such as building new plants and transmission lines as well as the fact that the electricity is harder to produce from other natural resources. These costs will often deter companies from trying to enter the electric generation business using renewable energy. The cost of using renewable energy conflicts with the main purpose of the restructuring act which was to save the consumers money because increasing the use of renewable energy increases the electric rates.

With the expenses of renewable energy in mind, two programs were established to create more interest in using it. First was the Massachusetts Renewable Energy Trust Fund which draws money from all electricity which is purchased by the consumer which

totals approximately \$25 million dollars a year in Massachusetts. The money is then distributed by The Massachusetts Technology Collaborative to different renewable energy projects in the state that need assistance. The second program is the Renewable Portfolio Standard which as previously discussed requires the continuing increase of renewable energy choices that are made available to the consumer. All electric suppliers are required to comply with this program by either purchasing renewable energy certificates from renewable generating facilities or putting money into the Renewable Energy Trust Fund.⁴¹

It is very hard to conclude if the restructuring process of the electrical industry in Massachusetts was successful, or if it ever will be successful. The main goals of the deregulation process were: decreasing electric rates for the consumers, increasing the reliability of the transmission system in the region, and having a less negative impact on the environment. Different aspects of these goals were achieved but the goals were not fully achieved but the process is continuing and these other goals may be achieved in the future.

⁴¹The Aim Foundation, "Electrical Industry Restructuring in Massachusetts: Progress in achieving the goals of the Restructuring Act." December 2005 [Internet] Available From: <http://www.aimnet.org/AM/TemplateRedirect.cfm?template=/CM/ContentDisplay.cfm&ContentID=9120> (accessed 11/19/2006)

Challenges of Restructuring and Deregulation

Transmission

The deregulation of the electrical industry brought about many changes to both process and policy. Before deregulation, there were monopolies on the power generation system and only companies x, y, and z were allowed to input into the system. Deregulation changed this and allowed the marketplace to open up and competition to increase. With the introduction of renewable resources such as wind, water, and solar power people are taking generation capacity into their own hands. Instead of having the excess power generated remain unused, the deregulation allowed these people to sell power back into the system. This introduced a whole new challenge to the electric companies and policy makers. With the increase in power generation, who would be responsible for insuring system capacity, maintenance, and providing the end point connection to a user's home?

Transmission capacity is one of the most important factors in the reliable delivery of electricity from the generation plant to the home. Scaling transmission lines to accommodate the increased power in the system was one of the most important steps. With inadequate transmission capacity, many inconveniences and dangers are produced. Without enough capacity in the system, there is a possibility for brownouts and blackouts. There is also a possibility of lines heating up and malfunctioning if there is too much power and not enough capacity. For these reasons, transmission lines are of the utmost priority.

It is no secret that as a society our energy usage is increasing. Today we are more aware of energy consumption than ever before, yet our usage continues to increase. This is mainly due to the increased technological products coming to market. We live in a time where everyone needs to be connected at all times. The Internet has played a major role in increasing the overall required power available on the grid. Power usage in the home has also greatly increased. Twenty years ago there was usually only one television available in the house, today it is not uncommon for one household to have several of them. The same is true of computers, ten years ago a family would have one computer that would be shared by all members of the house, and today it is not uncommon for each member of the family to have his or her own machine. In addition, many people are leaving these computers on 24/7, increasing the power demand on the system.

Generating capacity has been attempting to keep pace with the demand for electricity. In 2005 alone, there was an additional generating capacity of 17,622 megawatts added into the northeastern system⁴². This trend is expected to increase as consumers' demand for energy rises.

The transmission and distribution companies are not sitting idly by while the generation companies increase their power output. They are constantly working to keep their transmission networks ahead of the curve in order to be one step ahead at all times to avoid back log. For example, National Grid and Northeast Utilities are currently working on a plan to present to state regulators to outline the requirements for an increase in capacity in the Northeast grid. The plan includes spending \$1 billion on constructing ~100 miles of high-voltage transmission lines. This expansion is necessary to

⁴² Energy Information Administration. 2006. *Electric Power Annual – 2005*: On-line. Available from Internet, http://www.eia.doe.gov/cneaf/electricity/epa/epa_sum.html , accessed 24 March 2007.

accommodate all the different paths between generating plants, substations and consumer endpoints. It will also provide a long overdue upgrade to the grid around Springfield, MA, a location that has been troublesome in the regional grid⁴³.

Money although important, is not the only prohibiting factor on increasing the capacity of transmission lines. Safety issues are one of the main concerns of the deployment of high-voltage power lines. Although there has been a great deal of scientific evidence to prove the contrary, most people do not feel safe living under or around high-voltage power lines. There have been many concerns of the electrical fields surrounding these lines on the development of young children and overall health.

Another issue with the development of transmission capacity is the classic issue of NIMBY (Not In My Back Yard). This is the same problem that occurs with cell phone towers. People will be the first to complain that there is not enough capacity in the system but do not want to have any equipment near their house or have any that is in direct line of sight.

Unfortunately, the investment in high-voltage transmission capacity as a country has dipped in the later years according to Robert McLaren, Regional President of Massachusetts and New Hampshire operating companies of National Grid. As a response, the Federal Energy Regulatory Commission (FERC) has begun to offer many incentives to entice companies to increase their transmission capacity. The Northeast grid has held up better than most of the country, but there are still problem areas. Boston is an area that has been notorious for not having enough transmission during peak demands. As a response, National Grid and NStar are in the final stages of completing a 345,000 volt underground transmission line into Boston. At the time of this writing, this line is not yet

⁴³ Howe, Peter J. 2007. Utilities plan major upgrade of power lines. *The Boston Globe*, 7 March, F4.

active. NStar is having an issue of the line shorting out and is currently working to solve the problem so the line can be brought online⁴⁴.

National Grid is not only looking at high-voltage distribution as a possible issue. The company is also looking at ways to make its electrical distribution grid from the substations to the homes to be more efficient. In an effort to improve reliability on the lines, National Grid has taken a proactive approach. It has implemented a program that is designed to evaluate data on electrical transmission lines and pinpoint lines that have had reliability issues in the past. This will allow it to filter out what is causing the problems in the flow of electricity and enable it to replace the failing part, be it in the pole, grounding, cable, etc. This enables National Grid to remediate problem areas and improve the overall reliability of the grid⁴⁵.

Our demand for electricity is rising. The transmission and distribution companies are faced with the unique challenge of constantly staying ahead of the curve for electricity requirements. They are tasked with estimating overall power usage and where it will be one, five, or ten years from now. If they are unable to keep up with the request for energy in a particular area, they run the risk of major service disruptions.

Remaining Challenges

It is commonly assumed that the restructuring of the electrical industry is a process that takes place at only at the state level. This is simply not the case. There has been an extremely high level of involvement from the Federal government on the matter

⁴⁴ Robert McLaren, interviewed by Justin Odom and Bryan Shah., 2 March 2007. Northboro, MA, tape recording.

⁴⁵ Robert McLaren, interviewed by Justin Odom and Bryan Shah., 2 March 2007. Northboro, MA, tape recording.

and many programs and policies have been implemented due to the involvement of Federal agencies and Congress.

In November 2005 the Government Accountability Office released a report to the Subcommittee on Energy and Resources and the Committee on Government within the United States House of Representatives. In this report it was stated that there are four key challenges that must be overcome before deregulation of the electrical industry can be fully successful in the market place. These four challenges are⁴⁶:

1. Make wholesale markets work better together.
2. Provide clear and consistent signals to insure adequate energy supplies.
3. Connect wholesale markets to retail markets through consumer demand programs.
4. Resolve divided regulatory authority to ensure markets are adequately overseen.

Make wholesale markets work better together

Traditionally the electrical industry was extremely monopolistic. There would be very few entities within a region. These entities played the “Jack of All Trades” in the industry. They would be in charge of regulating, generating, and transmitting electricity until it was consumed by the end user. While this single entity allowed for a somewhat increased reliability of the grid, it made consumers vulnerable to manipulations of the market place as prices were not set based on the market demand but the decisions of a regulatory board. Deregulation changed all of this. Prices were no longer going to be set in a regulated fashion but would largely be determined by supply and demand.

⁴⁶ U.S Government Accountability Office. *Electricity Restructuring: Key Challenges Remain* (November 2005). Report. [<http://www.gao.gov/new.items/d06237.pdf>], Accessed March 29 2007.

Although there has been a great deal of legislation in the area of market structure, some issues still remain. First and foremost, FERC has limited authority on what it can and cannot regulate. Because of this, there are “holes” that can be created in the national wholesale market. These gaps can have a significant effect on overall restructuring because there is a possibility that the number of participants in these areas may be limited, hindering competition. The second problem is that FERC has a history of approving varying policies. While it is obvious that certain measures are required for different situations, not every policy can be different. Because of the mistakes that FERC had made by varying its policies, seams were created in the market. Different jurisdictions will each have different rules. This can make wholesale market interaction extremely difficult if not impossible.⁴⁷

While the market structure has proven somewhat successful, it still has some issues that must be overcome. FERC must work to remediate the different policies it has implemented and bring unity to its jurisdiction. However, FERC ran into major issues when trying to deploy a single market design between all regions. There were many industry stakeholders that were criticizing them for this. They instead encouraged the regional transmission organizations to reconcile their differences together⁴⁸. Only once it is a level playing field can wholesale markets truly interact unhindered.

Provide clear and consistent signals to ensure adequate energy supplies

Several laws throughout the 1990’s helped start-up electrical generation companies enter the market place. The Energy Policy act of 1992 required that the owners of the

⁴⁷ U.S Government Accountability Office. *Electricity Restructuring: Key Challenges Remain* (November 2005). Report. [<http://www.gao.gov/new.items/d06237.pdf>], Accessed March 29 2007.

⁴⁸ U.S Government Accountability Office. *Electricity Restructuring: Key Challenges Remain* (November 2005). Report. [<http://www.gao.gov/new.items/d06237.pdf>], Accessed March 29 2007.

transmission systems allow the new startup companies to utilize their transmission lines under the same prices, terms, and conditions that they apply to themselves. To accomplish this, FERC (Federal Energy Regulatory Commission) issued mandates that required the regulated monopoly utilities to separate their generation and transmission businesses. This came as a big hit to the companies as they were now being forced into one type of business and were being forced to overhaul their companies.⁴⁹

As can be expected, some companies had major issues with these changes. There were still concerns that some of the startup companies were receiving unfair access. In response to this FERC encouraged the utilities under its jurisdiction to form new organizations to manage the regional network and transmission lines. It was with this that the ISOs (Independent system operators) and RTOs (Regional transmission organizations) were born. FERC also approved the creation of multiple wholesale markets. The goals of these markets were to become central communication points to buy and sell electrical services. FERC also increased its efforts in improving the availability of price information used by suppliers to insure they were using the most up to date numbers.⁵⁰ Through these methods, FERC hopes to resolve some of the issues that seemed to be occurring through the supply chain.

The introduction of the ISOs and RTOs proved to be extremely successful throughout the industry. These industries provided unbiased regulation of the transmission network which allowed more people to enter the market place and sell electricity.

⁴⁹ U.S Government Accountability Office. *Electricity Restructuring: Key Challenges Remain* (November 2005). Report. [<http://www.gao.gov/new.items/d06237.pdf>], Accessed March 29 2007.

⁵⁰ U.S Government Accountability Office. *Electricity Restructuring: Key Challenges Remain* (November 2005). Report. [<http://www.gao.gov/new.items/d06237.pdf>], Accessed March 29 2007.

In some areas of the country, it has not been oversight that has caused the overall supply to grow but forecasted growth by nonutility companies. One example of a state that has utilized this method is Texas. By 2002, Texas had enough generating capacity available to meet 2004 projected demands. Unfortunately the pendulum also swings both ways as can be seen by California. In the same period, only about 25 percent of the forecasted need was built over the same period, causing massive market disruption.⁵¹

The interconnection of many different sources of power generation is not without its drawbacks. Traditionally individual regions were isolated from others. One region would generate and transmit its power and not be dependent on any other area. With the deregulated market place, this is no longer true. The states and electrical companies are becoming more interdependent on one another for a reliable supply of electricity. This poses an interesting problem because if one state has an issue with procuring and deploying electricity, then it is possible for surrounding states to have the same problem.⁵²

Connect wholesale markets to retail markets through consumer demand programs

While there have been numerous programs to encourage prices in the wholesale markets to be established by interaction between buyers and sellers, there has been very little done at the retail level. This is a major problem for the pricing of the electrical industry as the majority of electrical energy consumption takes place at the retail level by consumers. In many retail markets that have been opened to competition, prices are still

⁵¹ U.S Government Accountability Office. *Electricity Restructuring: Key Challenges Remain* (November 2005). Report. [<http://www.gao.gov/new.items/d06237.pdf>], Accessed March 29 2007.

⁵² U.S Government Accountability Office. *Electricity Restructuring: Key Challenges Remain* (November 2005). Report. [<http://www.gao.gov/new.items/d06237.pdf>], Accessed March 29 2007.

set to flat or frozen rates. FERC realized this issue and has proposed several proposals in an attempt to resolve the issue.

One of these programs FERC is hoping to create is a “demand-response” program. The main purpose of this program is to allow electricity buyers to see the price of electricity as they change throughout the day. Upon seeing these prices, the buyers would be provided the option to sell back electricity that otherwise would have been used. This issue has been referenced in the Energy Policy Act of 2005 and requires FERC to study demand-response and report its finding to Congress.⁵³

It is imperative that a hybrid system between retail markets and wholesale markets be created. This is extremely important to mitigate the damage that the retail electric market is capable of causing to the wholesale market. With the current disconnect, if electrical supplies are in short supply, consumers at the retail level can possibly unknowingly drive up the wholesale prices. The reason that this can occur is that consumers at a retail level do not see prices that are at the wholesale level. If the retail price of electricity is lower than the wholesale price of electricity, this can create major problems. Consumers have no incentive to reduce their electrical utilization because as far as they know their rates are low. What they are unaware of however is that this can force prices to skyrocket in the wholesale market and also decrease reliability of the overall grid. The current system makes it extremely difficult for FERC to accomplish the goal in its charter of insuring prices in wholesale markets are “just and reasonable”. It was also included in the report issued to the House that demand-response programs would help competitive electric markets function better together and increase the overall

⁵³ U.S Government Accountability Office. *Electricity Restructuring: Key Challenges Remain* (November 2005). Report. [<http://www.gao.gov/new.items/d06237.pdf>], Accessed March 29 2007.

reliability of the grid.⁵⁴ These programs would encourage the consumers to be more watchful of their energy consumption and allow them to see the true effects they are capable of having on the market place.

Resolve divided regulatory authority to ensure markets are adequately overseen

Perhaps the most important challenge that needs to be overcome is oversight of the market place. The restructuring of the industry has completely changed the ways and methods that the regulatory bodies oversaw the organizations. In the past, before deregulation, FERC ensured that prices were “just and reasonable” by approving rates that allowed for the recovery of appropriate costs and providing some profit. In the new system, this is no longer an option. To keep in line with their original purpose, FERC has shifted its regulatory role from approving prices to approving rules and market designs, monitoring electricity market performance to insure optimal operations, and enforcing market rules.⁵⁵

At a federal level, FERC established the Office of Market Oversight and Investigations in 2002. The purpose of this organization is to oversee the general operation of the markets by monitoring its enforcement hotline for tips on misconduct; conducting investigations and audits; and reviewing large amounts of data including wholesale spot and future prices, plant outage information, fuel storage level data, and supply and demand statistics. With all this data they look for anomalies that could lead to a disruption in the market place and cause problems. At a regional level with the deployment of ISOs and RSOs, FERC approved the creation of market monitoring units

⁵⁴ U.S Government Accountability Office. *Electricity Restructuring: Key Challenges Remain* (November 2005). Report. [<http://www.gao.gov/new.items/d06237.pdf>], Accessed March 29 2007.

⁵⁵ U.S Government Accountability Office. *Electricity Restructuring: Key Challenges Remain* (November 2005). Report. [<http://www.gao.gov/new.items/d06237.pdf>], Accessed March 29 2007.

within these organizations. These organizations were tasked with the duty of analyzing market data for their respective regions and dealing with violations through various methods, including imposing fines on violating organizations. The legal reach of these organizations has been extended with the introduction of the Energy Policy Act of 2005.⁵⁶

Challenges – Conclusion

It is obvious that the issues surrounding deregulation are not going to be solved overnight. It is an ongoing process in which there are no quick answers. It is a process that will require a reengineering of the way we currently think. The government will have to look at such issues as jurisdictional issues and find a way to form a balance between all groups. Organizations will also have to find a way to bridge some of the divides that have occurred such as the gap between retail and wholesale markets. Only through the mass cooperation of many organizations can restructuring truly be successful.

⁵⁶ U.S Government Accountability Office. *Electricity Restructuring: Key Challenges Remain* (November 2005). Report. [<http://www.gao.gov/new.items/d06237.pdf>], Accessed March 29 2007.

Economic Effects of Restructuring

Because those states that have restructured their electric utility industry have done so in different ways and with different results, a succinct summary of every economic effect of restructuring is impossible. For brevity's sake, the following section will focus on Massachusetts.

Cost of Electricity

With the initial introduction of restructuring, there was a drastic drop in the cost of electricity. This was due to rate-reductions instituted by the state of Massachusetts. For the year of 1998, there was a 10% reduction in the cost of electricity for standard service customers. In 1999, the reduction was increased to 15% of the original rate, again, for standard service customers.⁵⁷

Following this, there has been a steady increase in the cost of electricity until the middle of 2006, at which point, the cost of electricity has started to decrease, once again. However, the price dip was only for a few months, since in Dec. 2006, the forward capacity market system was put into effect, and among its consequences is a 0.5 to 0.75 cents per kWh increase in the cost of electricity for end-users.⁵⁸ This would boost the current average cost of electricity for residential consumers to slightly more than 10.5 cents per kWh; this is up from approximately 8.5 cents per kWh in 1997.⁵⁹

⁵⁷ Trends in Massachusetts' Electricity Retail Prices Fact Sheet, Energy Information Administration, last updated April. 9th, 2007. http://www.eia.doe.gov/cneaf/electricity/page/fact_sheets/mass.html

⁵⁸ New England's Forward Capacity Market: The Future is Now, Scott H. Strauss and Mark S. Hegedus, Public Power magazine: September-October 2006 Issue.

<http://www.appanet.org/newsletters/ppmagazinedetail.cfm?ItemNumber=17449&sn.ItemNumber=0>

⁵⁹ March 27th, 2007 Monthly Energy Review Section 9: Energy Prices pg. 14.

<http://www.eia.doe.gov/emeu/mer/pdf/pages/sec9.pdf> put out by the Energy Information Administration

The first of the aforementioned increases in the cost of electricity to customers was due to an increase in the cost of fuels needed to produce electricity in 2001. Later, in the wake of the Hurricane Katrina disaster in August and September of 2005, the price of oil and natural gas increased again, leading to further increases in the cost of electricity to the consumer. Regulation or not, these increases would have happened anyway.

The other increases are due to a number of factors. Again, the most recent increase is because of the forward capacity market, which the Massachusetts ISO hopes will encourage more investment in new generation capacity. There is also the fact that, when the former, vertically-integrated utilities sold off their generation facilities, many were not able to pay off the full balance of what they owed in the construction of those plants, resulting in a net loss. As a result, these utilities charged customers extra until this stranded investment was paid off. As of this writing, the increase to consumers is 0.4 of a cent per kWh and falling. Since 2004, an extra 0.25 of a cent per kWh has been added to the cost of electricity in order to fund programs to improve the energy efficiency of low-income dwellings, reducing their need for energy.⁶⁰ Finally, the availability for the lower cost standard service expired in March of 2005. As such, those customers who still used the standard service were automatically switched to the basic service. Because the discounts mentioned above only applied to the standard service customers, the average cost of electricity rose as customers started paying for the more expensive basic service.

⁶⁰ Massachusetts Department of Telecommunications & Energy Transition Book and 2006 Annual Report pg. 9. Dec, 2006. <http://www.mass.gov/Eoca/docs/dte/annualreport.pdf>

Knowledge of Restructuring and its Consequences

In the industrial and commercial spheres, companies are well aware of restructuring, the potential benefits of it and the risks involved. This is in no way surprising. After all, once companies reach a certain size, they are guaranteed to have a full-time staff of some size dedicated to handling finances. Something as major as the restructuring of the electric utility industry will not evade their notice.

Likewise, about 40% of mid-size companies in Massachusetts take advantage of their new choices for where to obtain their electricity. Over 75% of the largest consumers have been buying their electricity from competitive sources. Clearly, large consumers of electricity have benefited from the restructuring of the electric utility industry.

Residential consumers, on the other hand, are much harder to gauge. What is known is that only approximately 2% of residential customers have taken advantage of their new choices. How many residential consumers know of their choices, but don't feel it is worth the hassle to buy from competitive sources is unknown. After all, residential consumers already have jobs, and keeping up with the ever-changing market for electricity is itself a full-time job. Few small consumers have the time or inclination to check the market as conditions change, and as such, won't take advantage of their new choices.⁶¹

To their credit, the Department of Telecommunications and Energy has done everything in its power to inform customers of their new choices. Many retailers, such as National Grid, have also sent out information packets to consumers with the same purpose. Unfortunately, such packets are often immediately thrown out as "junk mail"

⁶¹ Massachusetts Division of Energy Resources 2007 Electric Power Customer Migration Data pg. 1. April 5th, 2007. <http://www.mass.gov/Eoca/docs/doer/2007migrate.pdf>

and the information on the DTE's website is only available to those who bother to access the page. Other steps taken by the DTE to inform consumers have returned slightly better results, but still fall short of the DTE's own goals.

Choices Available to Consumers

For sufficiently large consumers, it is possible and profitable to purchase directly from wholesalers or generators. This is due to their large demand for power, and the usual economies of scale that apply to large customers. It is worthwhile to wholesalers and generators because the high cost of such consumption means considerable profits for the supplier.

On the other hand, smaller customers and residential consumers have sufficiently fewer options available, because their smaller consumption means smaller profit margins for utilities. Thus, generators and wholesalers cannot be bothered to sell directly to individual residential consumers. Aggregate consumers, on the other hand, can take advantage of many of the benefits and economies of scale that were previously available only to large consumers, such as price negotiation and lower transaction costs; also, buying from competitive sources would become practical. Similarly, aggregation allows small consumers to patron green energy generators without the usual economic baggage that accompanies such a choice.⁶² Unfortunately, few municipalities have decided to take advantage of this opportunity and offer this service to consumers.

The only choices that are unavailable to large customers, but are available to individual consumers are, of course, low-income assistance options. Debt forgiveness,

⁶² Office of Consumer Affairs and Business Regulation Division of Energy Resources. Guide to Municipal Electrical Aggregation in Massachusetts pg. 3. Last updated January, 2007.
<http://www.mass.gov/Eoca/docs/doer/agg-guid.pdf>

reduced rates and such are available only to residential consumers who are otherwise unable to pay their bills. For obvious reasons, businesses are unable to take advantage of these last resort benefits (as are most residential consumers).

Effects of Restructuring on Low-Income Households

Since restructuring began in 1997, there has been a net increase in the cost of electricity. As such, assistance programs for low-income households are more important than ever. Luckily, there are plenty of protections for low-income households, though not all eligible consumers are enrolled in them, and in some cases the assistance consumers receive is less than the increase in the cost of electricity.

Energy assistance programs for low-income households

Programs that existed before the restructuring of the Massachusetts electric utility industry have either remained in place and intact or they have been expanded. For instance, in 1997, the Low-Income Home Energy Assistance Program (LIHEAP) was extended and now provides discounts on electricity consumption in addition to natural gas consumption. Likewise, since the start of restructuring, the Administration for Children and Families spent approximately \$14 million per year improving the insulation of low-income homes, repairing or replacing faulty and inefficient heating units and sealing up homes to prevent drafts.⁶³ The goal of all of this is to improve the energy efficiency of low-income households, so that they don't spend so much money on

⁶³ Massachusetts State Public Benefit Funds for Energy Efficiency, Administration for Children & Families. Last updated August 15th, 2006. <http://www.liheap.ncat.org/Supplements/2005/mauwx.htm>

heating, thus reducing their bills. In 2006, the maximum income for eligibility in these programs was raised to 200% of the federal poverty line.⁶⁴

Unfortunately, while more people are eligible for assistance, only one-third of those who are eligible are currently enrolled in energy assistance programs. This has been the case for some time, and in 2003 the Department of Telecommunications and Energy has attempted to implement a plan for automatic enrollment in energy assistance programs. While it is too soon to determine the success or failure of these efforts, a definite increase in enrollment was noted in 2006.⁶⁵

Equity of effects

Without question, large consumers of electricity have benefited the most from the restructuring of the Massachusetts electric utility industry. They benefit the most from restructuring *because* they are such large consumers of electricity. For one, large companies have enough money such that they can afford to have someone periodically evaluate the cost of electricity, and seek out the best bargain. Likewise, their large consumption makes it worthwhile for generators and wholesalers to sell their electricity directly to large industrial and commercial customers, providing even greater savings.

Residential consumers and small businesses cannot constantly seek out the best bargain, which often means that they will buy needlessly expensive electricity more out of habit than prudence. Nor is it practical for wholesalers and generators to sell their electricity directly to them. In fact, generators, wholesalers and retailers have little incentive to entice consumers to buy electricity from competitive suppliers, because it is

⁶⁴ Overview of Low-Income Restructuring Legislation and Implementation, Administration for Children & Families. Last updated February 8th, 2007. <http://liheap.ncat.org/dereg/states/massachusetts.htm>

⁶⁵ Increasing the Penetration Rate for Discounted Electric, Gas and Telephone Service DTE 01-106. National Consumer Law Center. November 14th, 2002. http://www.nclc.org/initiatives/energy_and_utility/111402.shtml

unlikely that smaller consumers would respond and because those few who do switch do not use enough electricity to make much of a difference. Only a large (and unlikely) migration of customers from one provider to another would have a substantial effect. Perhaps if small consumers took advantage of their new ability to aggregate into a medium to large consumer, then they would be in a better situation to take advantage of the benefits of restructuring.

By way of making up for these deficiencies, pre-existing consumer protections and discounts for low-income households have either remained in place or have been expanded. Likewise, most utilities do have arrearage management programs to help households that have fallen behind on their payments.

Unfortunately, prices have increased faster than the discounts for electricity. The result is that even though low-income households are receiving more aid now than before restructuring, some are actually worse off.⁶⁶ Thus, in the final tally, many lower class households and some middle class households and small businesses have been harmed by restructuring while the majority of large consumers have benefited from it.

Conclusions

⁶⁶ The Affordability Crisis pg. 10, Theo MacGregor. June 20th, 2005.
<http://www.marc-conference.org/2005presentations/MacGregor.pdf>

California Conclusions

California was the first state in the United States to implement a restructuring or deregulation plan for their electric energy industry. During this pioneering experience California encountered many issues. Many of these issues if encountered separately may have had a more positive outcome than what happened eventually in California. Instead there were multiple problems that happened concurrently that attributed to California's electric issues of the years 2000-2001. California experienced widespread rolling blackouts and declared electricity emergencies to a significantly high degree over that time period.

The rolling blackouts and declared emergencies were derived from several different causes. During this time California was in the midst of its electrical deregulation plans. Prior to and during 2000-2001 there was a cap on retail electric rates in the state. This cap was intended to help the public utilities recover stranded costs incurred by investments made prior to deregulation. The plan of the retail rate cap was that wholesale rates would fall when the electric generation market was opened up to competition, so keeping retail rates capped at a certain price would allow the utilities to recover their stranded costs more quickly. This plan would have worked, if only the wholesale prices of electricity had gone down as was predicted. Instead of this anticipated drop in price, the wholesale price of electricity skyrocketed. One of the reasons for this skyrocket was the lack of supply for an increased demand. During 2000-2001, there were many factors that caused the price of wholesale electricity to skyrocket. There were droughts in the Pacific Northwest which caused a decrease in the hydro electric power there. Also there were warmer and colder than average temperatures in both the northwest and southwest that caused increased strain on the power grid because

of the increased need of energy for heating and cooling. Another reason for the huge increase in wholesale electric costs was the rise in natural gas prices. Natural gas fueled a large number of power plants in the California area and this increase in price affected how much these plants could sell the electricity they generated for. An additional reason for the unforeseen rise in wholesale electric prices was a lack of generation over the course of 2000 to 2001. During that time period there were both scheduled and unscheduled downtimes of power plants that seemed to coincide with each other too often causing huge lulls in available electricity. Also, there was a lack in the building of new generation facilities during this time period. The lack of new generation facilities was partially due to a lack of investment in new facilities because corporations and individuals who would normally have invested in new generation facilities did not because of the uncertain market conditions at the time for electricity. A final reason for California's astronomic rise in wholesale electric prices was the companies involved in selling the electricity to California's utilities. There were several companies accused and convicted of offenses that occurred during the California energy crisis and also contributed to it. One of the major companies involved in that scandal was Enron. Enron, among other companies were charged with price gouging and collusion among other things related to the inflated electric costs in California.

Overall California experienced many unfavorable conditions during its attempt to deregulate its electric energy industry. These unfavorable conditions all happening at the same time most likely caused the ultimate re-regulation of California's energy industry. If the legislation that initiated the deregulation of the state had not been rushed through, or if there had been better ways to reverse the changes, California might not have experienced such a significant crisis as a result of the deregulation. Although, if some of

the inopportune issues had not occurred California may have been successful in its endeavor, but ultimately the state was not.

Massachusetts Conclusions

It is very hard to conclude if the restructuring process of the electrical industry in Massachusetts was successful, or if it ever will be successful. The main goals of the deregulation process were: decreasing electric rates for the consumers, increasing the reliability of the transmission system in the region, and having a less negative impact on the environment. Different aspects of these goals were achieved but the goals were not fully achieved.

The major goal of deregulating the electric utility industry was to lower rates for the consumer. Electric rates have not decreased but have actually increased since the deregulation process began. It is nearly impossible to tell if this was a direct result of the deregulation process or due to other factors. The goal of having less of an impact on the environment has certainly contributed to higher rates. Newer, more efficient equipment is costly and also brings with it the expenses of upgrading plants. Using renewable energy sources is much more costly than using the natural resources that the industry has been using for decades. The rising prices of natural resources since the deregulation process began, as well as inflation, and a few other factors have also contributed to rising costs in the electrical industry. The problem with trying to determine if the deregulation process was successful in lowering consumer rates is that we are unable to discern how much of the increase in rates was due to these outside factors and how much, if any, was actually due to the deregulation process itself.

It appears that the goal of increasing the reliability of the transmission system in the region was accomplished but must continue to be addressed. Generation has increased in the area but must continue to grow as it is believed that the demand will continue to grow. Adding renewable energy generation will contribute to this goal as well as building other new power plants and making the existing plants more efficient. The state has added many transmission lines since the deregulation process began. Transmission lines must also continue to grow along with the demand. The problem with adding transmission lines is that much of Massachusetts is developed making it harder to run transmission lines to certain areas. New ways have to be developed to transmit the electricity and, although the state has begun to do so in ways such as running lines underground, they must continue with this goal.

The goal of having a less negative impact on the environment has also been successful. Emission rates have decreased from existing generating plants as their technological upgrades and therefore efficiencies have increased. The introduction of renewable energy sources has helped but has not been pursued as much as predicted with many distributors simply buying credits or paying fines rather than meeting the standards that were set. Some renewable energy generators have arisen since the deregulation process began but if this goal is to be achieved, the state needs to put more effort into pursuing this technology.

Economic Conclusions

Due to the various factors that affect the price of electricity, whether restructuring, in and of itself, drove prices up or down is unknown. To be sure, the price of electricity

has risen slightly more than 20% since restructuring was started in 1997. However, most (and possibly all) of that increase could be due to grid upgrades and maintenance, increases in fuel costs and taxation. So the real question is: would this increase be greater than or less than 20% under a regulated environment?

It seems clear that the introduction of competition in electric generation lowered prices. The ability for consumers to purchase electricity from whomever can most cheaply provide it, or to cut out the middle-man entirely, has forced generators and wholesalers to do everything in their power to slash prices.

However, only larger consumers are able to take advantage of these savings. This is because their demand for electricity necessitates having people on hand to follow the ever-changing market and switch from one wholesaler to the next, ensuring the best bargain for the consumer (typically a large commercial or industrial entity). The large consumption of these companies means that the contracts to sell them electricity are quite lucrative, which leads to wholesalers lowering prices to entice these consumers to switch providers.

Small consumers, on the other hand, do not use enough power to influence prices. Likewise, they do not have enough money to dedicate a full-time staff towards “shopping around” for the best bargain. Nor do they have the time to do so themselves. Most of these consumers are single family households who have more pressing concerns than saving fractions of cents per kWh. As such, the advantages of competition pass small consumers by.

This fact was accounted for and addressed in the restructuring legislation. As such, small consumers were granted the ability to aggregate and, in a way, become a large consumer. In this way, all the benefits that large consumers enjoy are available to

conglomerations of small consumers. Transactions costs would be spread out among the many consumers, and the cost of hiring staff to purchase only the cheapest electricity would be a pittance for each individual customer.

On a similar vein, the restructuring of the electric utility industry allowed for the brokering of electric power. That is, a company could make their business in purchasing electricity at the lowest possible cost, much like the staff of a large business or aggregation, and then sell it to consumers at a slight markup.

Unfortunately, few small consumers take advantage of these options, either due to lack of knowledge, lack of time or lack of desire. As such, large companies have prices that are (almost certainly) lower than they would be under the previous system, while small consumers are either paying the same or higher costs now than they would in a regulated environment.

Transmission Conclusions

Although deregulation of the electrical industry is still in its infancy, several great strides have been made in the past few years.

One of the main requirements of deregulation is the allowing of anyone to sell power back in to the electrical grid. This requirement posed an interesting dilemma for the electrical transmission grid operation. Before deregulation, there was X amount of energy that was input into the grid. The transmission companies would be kept in the loop of when additional plants would be coming online or when existing ones would be increasing their generating capacities. In the new system, even people who have solar panels on their roofs would be able to sell excess energy back into the system. This

created an elastic level of energy supply on the grid as it could fluctuate and the transmission companies would not always have advanced notice.

Overall the transmission companies have done a good job with keeping up with the demand on the system. There have been several issues where problems have occurred due to a lack of capacity in the system, but they have worked quickly to address that. One example is the grid in the northeast. In the past several years there have been several high voltage lines installed in the area to provide a greater level of transmission capacity. There also has been a great deal of expansion of transmission lines running into areas of high use such as major cities, for example, Boston.

Transmission companies will however be in a constant battle to ensure that there is reliable transmission capacity available throughout the grid to fill our ever increasing need for power.

Government Conclusions

Deregulation is a process that can be unpredictable at times. Deploying a deregulated electrical environment is different in each state and each market it is setup in. As a result, some level of oversight is crucial. The RTOs in each region are responsible for this oversight. It is imperative that these organizations are given the ability to monitor the markets as well as the records of companies that are involved with electrical generation and transmission. It is the goal of these companies to ensure that the market for electricity is fair and free of corruption.

It is also important that the RTOs and FERC work to increase awareness between retail and wholesale markets. The retail market has a significant impact on the general operation of the electrical grid. Without adequate connections between these two

markets, situations like California are capable of occurring. If these markets were connected, there would be a balance between the two. If wholesale prices are rising, ideally consumers at the retail level would be more careful of their electrical usage to help keep costs down.

Promise of Deregulation

The deregulation of electricity was based on one major preconception. This preconception is that after the industry is deregulated the prices of electricity will be lower than before the industry was deregulated. This preconception has not exactly shown to be true as the dust of deregulation is beginning to settle in place where deregulation has occurred. There are some instances where large corporations have seen a decrease in prices of electricity because of the vast purchasing power with which they can negotiate, but the same is not true for the every day residential consumer. The fact that electric prices are not down after the states have completed deregulation is not necessarily a product of deregulation itself however. In Massachusetts for instance, the price of electricity has not gone down after deregulation. The lack of a price drop in Massachusetts, and in fact an increase in rates can not be directly attributed to the fact that the industry was deregulated recently. There are other factors that can be seen as contributing to the price of electricity over the same time period, such as the rise in oil and natural gas prices over the same time period. Overall it is difficult to say whether deregulation has been either an overwhelmingly good thing, or an overwhelmingly bad thing, overall the results of deregulation have been predominantly inconclusive on that front.

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