

***The Effects of
Utility Deregulation
on the
Nuclear Industry***

*DeLeah Lockridge
Texas A&M University
National Society of Black Engineers*

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ABOUT THE AUTHOR

DeLeah Lockridge is a candidate for a B.S. degree in nuclear engineering at Texas A&M University in College Station, Texas. During her academic career, she has participated in such programs as the *Engineering in Italy '96 Study Abroad Program* and the *NASA Reduced Gravity Student Flight Opportunities Program* in the spring of 1997. She was selected to participate in the *Washington Internships for Students of Engineering (WISE) Program* for the summer of 1997. Her internship was sponsored by the National Society of Black Engineers (NSBE). This paper presents the results of Miss Lockridge's research during the internship.

WISE

Washington Internships for Students of Engineering (WISE) is a ten-week program that allows students with senior status to spend the summer in Washington D.C. learning how engineers contribute to the public policy making process. The students meet with government officials and other policy makers to discuss complex policy issues relating to engineering, science and technology. The culmination of this internship is a research paper analyzing a policy issue of interest to the student and his or her sponsoring society.

For addition information about the WISE Program, contact: WISE, Attn. Anne Hickox, 400 Commonwealth Drive, Warrendale, PA 15096-0001, (412) 776-4841, or fax (412) 776-2103.

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EXECUTIVE SUMMARY

For the past few years, nuclear power plants have been supplying over 20 percent of America's electricity. When compared to other sources of electricity, nuclear energy is second only to coal-fired power plants. Even under intense regulation by the federal government and local authorities, nuclear power has continued to play a major role in the production of electricity.

Now a new challenge has emerged: utility deregulation. *Wholesale* deregulation began with the Energy Policy Act of 1992 (EPACT), which in essence divided utility companies into generators and distributors. EPACT allowed utility companies to make unregulated purchases of electricity from other power producers or from independent marketers. *Retail* deregulation would change the rules yet again. Customers will no longer be required to buy electricity strictly from local suppliers. Any distributing utility company could sell electricity directly to business and home owners. Retail deregulation has already taken place in some states, and other states are likely to follow. But several issues must be resolved before the utility industry is fully deregulated on the state and national level.

Stranded costs is one of these issues, and it poses the most threat to the nuclear industry. In the 1970s, utility companies made investments to meet the future needs of their customers. Power plants, both coal and nuclear, were constructed and paid for with these investments. If deregulation legislation is passed, customers can leave their utility company before that invested money is fully recovered. If utility companies are not allowed to recover such investments, the likelihood of their survival in a competitive market is minimal; and the nuclear power industry will be severely crippled. However, if stranded costs are recovered, then the nuclear power industry will not only survive the transition, but it will thrive in this new environment.

Another issue worthy of discussion is nuclear waste. In 1982, the federal government passed the Nuclear Waste Policy Act (P.L. 97-425), in which they agreed to begin taking highly radioactive materials (i.e. spent nuclear fuel) for permanent disposal in January 1998. With this date quickly approaching, the federal government has admitted that they will be unable to comply. In a meeting on July 15, 1997 between The Office of Civilian Radioactive Waste Management (Department of Energy) and the utility companies, monetary compensations were offered to the utility companies in order to continue temporary disposal/storage at their respective sites. The utility companies came to the meeting with a different agenda; they expected the federal government to honor their contract. No agreement was reached. Some resolution must be made in order that nuclear power remain a viable source of electricity after deregulation.

Congress is trying to find the best solution to this multi-faceted issue. Bills have been brought to the floor that discuss the recovery of stranded costs, initiation of retail deregulation by the states versus the federal government, and environmental effects of deregulation. Debates in the House and Senate will continue until common ground is found.

It is my belief that the *states* should initiate retail deregulation. It would be more beneficial to the states (and to customers) to implement a plan for retail deregulation. The federal government may not be able to meet the needs of each state; therefore, the federal government should step in only if the process implemented is unsatisfactory.

I also believe that at least 85 percent of stranded costs should be recovered by the utility companies. In many cases the utility companies were obligated by the federal government to build new power plants to meet America's growing need. Since the federal government required the construction of these plants, the utility companies should be permitted to recover a large proportion of their investments.

Finally, the federal government needs to *commit* itself to the permanent disposal of nuclear waste. When the federal government fails to comply with its own legislation, then business and industry lose faith. When the nuclear waste policy is passed *and* fully implemented, then the most burdensome hindrance to the growth of the nuclear power industry will be removed.

Over the past 40 years, nuclear power has overcome every possible setback; and this industry can survive the transition to a competitive market. But the conflicts surrounding deregulation must carefully be resolved in order to maximize the benefits to the utility companies, the nuclear industry and to consumers.

1 INTRODUCTION

In Dr. Alan Waltar's book, *America the Powerless: America's Nuclear Energy Dilemma*, nuclear energy's future role in the electric utility industry is addressed. Waltar clearly points out the advantages of nuclear power over the other fuel sources and he convincingly discredits many of the myths surrounding the nuclear industry. He even discusses reactor safety, risk and environmental responsibilities. But one topic that Dr. Waltar did not address in his book is the transition of utility companies to a competitive market.

Utility deregulation is relatively new issue that deserves much attention. It will completely restructure the way electricity is bought and sold in America. Although nuclear power has proven beyond doubt that it is capable of meeting America's demand for electricity, consumers simply may not choose a nuclear power plant as their electricity supplier. In addition to this, utility companies with nuclear plants stand to lose an estimated \$70 billion in investments- investments that were made to meet the growing need for electricity (NEI, Arena, 30 December 1996). It is evident that this is an issue that will not go away. But will utility deregulation do more harm than good to the nuclear industry?

1.1 Definition of Deregulation Issue

Deregulation in the electric utility industry refers to the removal of regulatory obstacles that control the sale, generation and distribution of electricity. Prior to 1992, utility companies were obligated by the federal government to serve all customers within certified regions. *Wholesale* deregulation, which began in 1992¹, gives independent power companies access to transmission lines once monopolized by utility companies. By having access to these transmission lines, independent power producers and marketers can make unregulated sales of electricity to other utility companies in various regions (TPPA, January 1997²). This makes the market for customers competitive.

Retail deregulation takes one step further by permitting direct sale of electricity to "end-use" customers (TPPA, January 1997). Business and home owners will be able to select their electricity supplier. The goal of retail deregulation is to satisfy these key objectives:

- *Maintaining the financial integrity of prudent investments in existing generating facilities while*
 - *Allowing consumers more direct access to a wider spectrum of electricity generation options* (NEI, Priority, 1997).

¹Energy Policy Act of 1992.

²For a list of acronyms, see appendix.

With wholesale and retail deregulation, the electric utility industry becomes a fully competitive market.

1.2 Driving Forces Behind Deregulation

The call for a competitive market is due to four key events:

- Public Utility Regulatory Policies Act (PURPA) of 1978
- Competitive bidding¹
- Energy Policy Act of 1992
- Federal Energy Regulatory Commission's Order 888 of 1996 (NEI, Restructuring, March 1997)

¹Traditionally electric utilities built new power plants when needed. Beginning in the 1980's, states began to require competitive bids for new suppliers of electricity.

Each of these events has paved the way for deregulation legislation¹, but there are other impetuses behind this new market. Business and industry are the primary driving forces behind the deregulation of utility companies. Electric bills are often the largest expense of companies, especially manufacturers. *Raytheon*, Massachusetts largest employer, threatened to move its business out of state due to a \$22 million electric bill (Mazzarella, 7 March 1997). Similarly, other places around the country are looking for price breaks in their electric bills.

¹See section 2.4 for further explanation of acts.

Another driving force behind deregulation is the consumer. With competition comes price wars. Companies will lower their rates and offer special discounts just to increase their customers. These discounts could save consumers up to 10 percent on their utility bills¹ (Mazzarella, 7 March 1997). In addition to lower rates, the electric companies must make improvements in the quality of service in order to maintain or increase their patronage (Crandall and Ellig, January 1997). The phrase "survival of the fittest" surely applies in this potential new market.

Studies have shown that in other industries that have undergone deregulation, consumer benefits are in the billions of dollars. For example, the airline industry was deregulated in 1977. From 1977 to 1987, consumers have seen \$19.4 billion in benefits (Crandall and Ellig, January 1997). In 1984, the telecommunications industry was deregulated; and AT&T relinquished some of its monopoly to new competitors. With competition comes consumer choice; and it is in the best interests of the company to meet the needs of their clients. The best "marketing tool" for a company desiring to increase clientele is a happy customer.

Deregulation, however, is not a desired choice for everyone. Some small business owners are concerned that "hasty transition to retail competition coupled with generous stranded cost recovery could trample their interests." Without the resources and technical support possessed by larger companies, these smaller businesses fear they may not be equipped to intervene in the policy process. (Electric Power Alert, 29 January 1997).

Additionally, some utility companies have well-founded fears/concerns about entering a competitive market, the greatest of which is a significant loss of customers. If utility companies cannot offer competitive rates, then they can expect to lose customers, making recovery of stranded costs difficult. This is not good news to shareholders in investor-owned utility companies, who would be at risk of losing some their long-term investments.

1.3 Repercussions from Phasing out of Nuclear Energy

"As nuclear power plants continue to operate more economically and generate more clean electricity, large majorities of Americans remain in favor of keeping existing plants operating, and maintaining the option to build new plants in the future."

Joe Colvin, President and Chief Executive Officer of the Nuclear Energy Institute.

Joe Colvin is very optimistic about the future of nuclear power in the competitive market. Nuclear power plants have been producing electricity for 40 years now, and they have a

¹Unfortunately, not all consumers will have lower rates.

stable position in the utility industry. But what would happen if nuclear power plants did not survive utility restructuring?

1.3.1 Economical repercussions

The cost of electricity from a power plant is determined by capital costs and production costs. Capital costs refer to construction costs, debt and equity, investment returns and capital expenditures after the plant begins service (i.e. replacement steam generators) (NEI, Economic, December 1996). With advances in nuclear power plant design, construction costs are decreasing. For example, the advanced light water reactor (ALWR) will be available to utility companies by the end of this century. This new reactor is “simpler, safer and less expensive to build and operate than existing plants” (CRS, 30 May 1997). This will reduce capital expenditures for utility companies that plan to keep nuclear energy as a source of electricity.

Production costs are those expenses incurred through operation and maintenance of the power plant, as well as the cost of fuel (NEI, Restructuring, December 1996). Nuclear power has low production costs and no “hidden costs.” Since the cost of power production, waste disposal and decommissioning is included in the price of electricity, the cost of electricity is actually close to its value (NEI, Economic, December 1996).

In 1995, the 109 operating nuclear plants in the United States produced 673 billion kilowatt hours of electricity (NEI, Basics). At an average rate of 1.92 cents charged per kilowatt hour, the utility industry sees almost \$1.3 trillion from nuclear power plant electricity production. If nuclear power plants were phased out of the electric utility industry, more plants- most likely coal- would need to be constructed to meet the demand for electricity. This means that many of the utility companies would have to spend some of their profits from the new competitive market on construction and operation of these new plants.

The larger utility companies and alliances may be able sacrifice some of their profits without suffering greatly; but some smaller utility companies will not be in a position to have immense expenses with the loss of investments pending. Their losses outweigh profits in this scenario.

1.3.2 Environmental repercussions

In 1995, nuclear power plants

- *prevented the discharge of 146 million metric tons of carbon (significantly more than the annual 108-million-ton carbon reduction in the administration’s Global Climate Action Plan)*
- *reduced nitrogen oxide emissions by 2.5 million tons (more than the annual reduction specified in the Clean Air Act Amendments’ goal.*
- *reduced sulfur dioxide emissions by 5.1 million tons (more than half of the Clean Air Amendments’ goal).* (NEI, Priority, January 1997)
- These environmental goals, established to reduce air pollution and global warming, could not be reached if new plants were constructed to replace nuclear

power plants. Although solar and hydroelectric energy emit no air pollution¹, these forms of energy do not contribute as much to U.S. electricity (NEI, Knowledge). And most utility companies would opt to build coal power plants. The added emissions from new coal plants will have a negative effect on the environment.

-
- **1.4 Public Response to Deregulation/Nuclear Utilities**
- In a poll² taken by Representative Tom Bliley, Chairman of the Commerce Committee, the 66 percent of the responding public said that if given a choice, they would be willing to pay more for non-polluting electric power.
-
- In a national poll taken by the Nuclear Energy Institute, 67 percent of the public responded that nuclear energy should play an important role in the future of electric power. In another poll, 73 percent responded that it was a good idea to renew licenses to current nuclear power plants that meet federal safety standards (NEI, Public, November 1995). The public sees the benefits of nuclear energy, and they feel that it should be one of the key players in this competitive market.
-

¹For this report, air pollution refers to carbon, nitrogen oxide and sulfur dioxide emissions.

²Poll was conducted April 16-20, 1997 by Frederick Scheiders Research. The poll was based on results of a nationwide representative telephone survey of 1,012 adults. Overall margin of error is +/- 3 percent at the 95 percent confidence level.

2 BACKGROUND

For 117 years, utility companies have supplied customers with the electricity they need. Public, private and government-owned utility companies use various sources of energy to produce that electricity. Although nuclear power plants are relatively new on the scene, they have managed to make a noticeable impression on the electricity market.

During this long history, key legislation has been enacted to regulate the way that utility companies generated and distributed electricity. As with any augmenting industry, growth and development are making these once effective laws obsolete. Various agencies have labored to remove some of the stresses caused by outdated government regulation. These same organizations and other key players must once again work together to ensure that full scale deregulation is a success.

2.1 Utilities

The utility industry had its beginnings in the late 1800s with the invention of the light bulb. Now there are almost 3200 utility companies in the United States alone.

2.1.1 History of utility companies

The utility industry began in 1879 with Thomas Edison. Edison was performing experiments in his laboratory, which was lighted by natural gas. When he became delinquent with this payments, the New York City Gas Company turned off the gas to his laboratory . Edison and his assistant established the Pearl Street Station Electric Company. Soon after the Pearl Street Station, other utility companies formed to serve the growing demand for electricity (NLC, March 1997).

2.1.2 Types of utilities

Four types of utility companies exist today. The largest group is publicly-owned utilities. Publicly-owned utility electric systems are non-profit, state and local agencies that serve at cost (O'Brien, 199?). The money collected from bills stays in that are to benefit its customers. Additionally, publicly-owned utilities are exempt from federal income taxes. They also enjoy tax-exempt financing, which gives them a competitive advantage over intestor-owned utilities (Jost, 17 January 1997).

Rural electric cooperative systems were established to provide electricity to small rural communities and farms where electric service is relatively expensive. Most of them are owned by the people they serve. Like publicly-owned utilities, rural cooperatives enjoy some of the same tax exemptions. which give them a competitive edge. There are currently 931 rural cooperative utilities in existence.

Federally owned utilities are primarily generators and wholesalers of electricity. These non-profit utilities give purchasing preference to rural cooperatives, publicly owned utilities and other non-profit entities. Because they are federally owned, some of these utility companies already operate on the wholesale and the retail level (O'Brien, 1997). But this is no guarantee that retail sales will continue after deregulation.

On the other end of the scale are private or investor-owned electric utility systems. These utility companies are owned by shareholders. Profits are either reinvested or distributed to the shareholders as dividends (O'Brien, 1997). Currently more than 7,000,000 Americans own utility stocks (AFCE, Who owns, 1997). A foreseeable problem with investor-owned utility companies is that the investors could lose part of their investments with this transition. The stability offered in the regulated, traditional market is replaced by capital risks. Stranded assets will be lost if the utility companies are not allowed to fully recover shareholder investments.

Charts after CQ Researcher, Jan. 17,1997, pg. 30

As the graphs shows, there are only 244 investor-owned utility companies; but they make 74 percent of the sales to customer (O'Brien, 1997). Comparatively,

the 2014 publicly-owned utilities make 11 percent of the sales; and the 10 federally owned utilities make 9 percent. These numbers could change in a competitive market.

2.2 Role of Nuclear Power in Utilities

The first commercial nuclear power plant went on-line in 1957. President Dwight Eisenhower paved the way with the transmission of an electronic signal beamed from a television studio in Denver, Colorado to Shippingport, Pennsylvania (NEI, History). By 1967¹, the United States had 13 operating nuclear units.

Chart after USA Today, March 7, 1997.

Due to the 1973 Arab oil embargo, demand for electricity decreased. Contrary to popular belief, the decline in construction of power plants was not a result of the Three Mile Island Incident (TMI). Over 200 power plants- half of them fossil fuel and half nuclear- were canceled between 1974 and 1991. As the following chart shows, no orders for new plants have been made since 1979.

The Rise and Fall of Nuclear Power

03 24 92
0 1 2 3 4

Number of Plant Orders v. Years

Graph after FRONTLINE and Nuclear Energy Institute.

The following table illustrates major events corresponding to the rise and fall of nuclear power.

Year	Events
1973	Arab oil embargo
1977	Carter's policy not to reprocess spent fuel
1979	Three Mile Island accident
1979	<i>China Syndrome</i> movie release
1986	Chernobyl accident

Table after FRONTLINE and Nuclear Energy Institute.

TMI did however result in increased production costs for nuclear plants. After TMI, the Nuclear Regulatory Commission and other Federal Agencies placed stringent regulations on the utility companies. This forced the nuclear power plants to operate more efficiently.

¹1967 marks the 25th anniversary of Enrico Fermi's experiment.

Nuclear energy now supplies over 20 percent of America's electricity. There are currently 109 reactors in operation (NEI, Basics, 1997), and designs for advanced nuclear reactors are under review by the Nuclear Regulatory Commission. These reactors are safer, simpler and less expensive than reactors in operation today.

Although nuclear power is second to coal in fuel, it continues to offer competitive rates. According to the Utility Data Institute, the cost per kilowatt hour for coal-generated electricity is 1.88 cents, while nuclear power plants produce electricity at 1.92 cents per kilowatt-hour. Natural gas has a considerably higher cost at 2.68 cents per kilowatt-hour (NEI, Issues, 1997). Oil comes in at a distant fourth with 3.77 cents per kilowatt-hour (NEI, Restructuring, 1997).

2.3 Enacted Laws/Regulation

" V 2 During the 1930s, several laws were enacted in order to "eliminate unfair practices and abuses by electricity and gas holding companies by requiring federal control and regulation of interstate public utility holding companies" (CRS, 1997). Under these laws the utility companies were obligated to serve a specific region. The utility companies also agreed to rate regulation granted that the rates would allow a "decent" profit over costs (Nat'l League of Cities, p.5).

As the need for electricity grew, more power plants were constructed. Monopolies formed, which gave some utility companies an unfair advantage. Again, the federal government stepped in with more legislation to control the monopolies and to open the market for independent power producers and distributors.

Bills in the House and Senate are carefully being scrutinized to make sure that the transition to a fully competitive market is a "fair" one. Electric utility agencies, such as the Alliance for Competitive Electricity are doing all that they can to make sure that representatives are well informed.

2.4 Involved Agencies

Customers, shareholders and employees of the electric utility industry have much at stake in retail deregulation. Agencies, both public and private have formed to voice the differing opinions of the people/entities they represent. These key players¹ hope to have the strongest influence on the outcome of this issue.

The Alliance for Competitive Electricity (AFCE) emerged from a decision split² within Edison Electric Institute (EEI). This group of investor-owned utilities says that the transition to retail competition should be left to the states, but opposes a

¹For a comprehensive list of key players in utility restructuring, please see appendix.

²Another group that formed from this split is the Partnership for Customer Choice.

certain date for competition to begin. AFCE also believes that any proposed legislation should make provisions for stranded cost recovery. Members of this alliance include Entergy Corporation, Duke Power Company and Detroit Edison Company.

The American Public Power Association (APPA) has been a public power advocate since 1940. This body of consulting firms, power marketers and federal power systems says that states should not only initiate deregulation, but they should also decide on the recovery of stranded costs. APPA supports the preservation of PUHCA and the revocation of PURPA. APPA also advocates the formation of new municipal utilities.

The Consumer Energy Council of America Research Foundation (CECA/RF) is a “public interest energy policy organization that serves as a national resource for information, analysis and technical expertise on a wide variety of public policy initiatives” (Electric Power Alert, 29 January, 1997). Its primary concern is “to ensure reliable and affordable energy for all sectors of the nation, with proper regard to environmental values” (Electric Power Alert, 29 January, 1997). Constituents include APPA, EEI, the Department of Energy and representatives of U.S. House and Senate.

The Nuclear Energy Institute’s (NEI) number one interest is stranded costs. Utilities with nuclear plants, such as Baltimore Gas and Electric, want guaranteed retrieval of stranded investments. However NEI is unsure of the federal and/or state role in determining stranded costs. NEI is also pushing for legislation to alleviate America’s nuclear waste problem.

3 KEY CONFLICTS AND CONCERNS

What is in question is the proper steps toward restructuring. All of these conflicts should be addressed and resolved before full-scale deregulation is implemented.

3.1 Who initiates deregulation?

Debates continue in the House and Senate over who has the right to initiate deregulation, and if the federal government should be involved at all. Six states (Arizona, California, New Hampshire, Pennsylvania, Rhode Island and Vermont) have already begun retail deregulation (Weisman, 1997). Congress plans to use these states as models for future legislation.

3.2 Will there still be a need for nuclear energy?

The demand for electricity is growing faster than the population, and the cost of living is not likely to decrease (Waltar, 1995). With limited resources of coal and oil, America will turn to nuclear energy as a vital source of electricity for the future.

3.3 What about stranded costs?

Another issue that must be resolved is stranded costs. Utility companies built coal-fired and nuclear power plants during the early 1970's in response to the Arab oil embargo. During the late 1970's, however, the power companies faced a decreasing demand for electricity. Numerous power plant orders were canceled. In addition to decreased demands, production costs for nuclear power plants skyrocketed after the TMI.

Over the past few decades, utility companies have been recovering their costs through surcharges. But the independent power companies, or non-utility companies, do not have these expenses. Therefore they are better positioned for a competitive market. Utility companies argue that they should be allowed to recover these cost incurred in meeting the public's demand for electricity. On the other hand, non-utility companies and some members of industry feel that "survival of the fittest" should be the adopted policy. Utility companies could not use natural gas as a fuel source (Power plant and Industrial Fuel Use Act of 1978). (NEI, Restructuring, 1997)

Of the estimated \$200 billion industry wide total transitional costs, \$70 billion pertains to nuclear power (NEI, Arena, 1997). The nuclear industry has a fighting chance if the utility companies are allowed to recover stranded costs. Stranded costs will be used to pay for fuel, maintenance, and decommissioning.

3.4 What are the related environmental concerns?

3.4.1 Energy Policy Act (1998) particulate matter

Nuclear power plants do not contribute to air pollution, but utility companies own more than just nuclear plants. All utility companies must fall in compliance with new EPA standards.

3.4.2 Nuclear waste

Although the Federal Government agreed to begin taking highly radioactive waste from the nuclear power plants in January 1998, they have realized that this goal is unattainable. Current meeting between the Department of Energy (DOE) and the industry are at a stalemate; industry wants DOE to fulfill the contract which they established. But the DOE has not completed its research at Yucca Mountain, the proposed permanent site for the nuclear waste. DOE says that the permanent site won't be ready until 2010 (Arena, 1997).

5 CONCLUSIONS

5.1 Suggestions to Current Proposals

Many of the bills in congress fail to address deregulation comprehensively. The final enacted law needs to ensure a level playing field, make provisions for stranded cost recovery and address possible environmental concerns.

5.2 Recommendations

States should be allowed to initiate deregulation. Each state can implement a plan that better meets the needs of their state; it would be more effective than comprehensive federal legislation.

At least 85 percent of stranded costs should be recovered by the utility companies. Since the federal government mandated that these utility companies build the plants to meet future needs, the companies should be allowed to recover these prudent investments

In an effort to comply with new Environmental Protection Agency Standards, the newly designed light water reactors should be considered. Many of these reactors are presently being constructed in Asia to meet their growing electricity demands (Weisman, 1997). The Nuclear Regulatory Commission is reviewing new plant designs, and they should be available for orders in the U.S. in the next century.

Joe Colvin explains it simply:

*“The real test of whether any power plant will succeed in a competitive environment is based on production costs. “ With such competitive rates in electricity production, “nuclear power plants pass this test with flying colors.”
(NEI Arena).*

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Appendix:
Key Players in Utility Deregulation

List of Acronyms

AFCE	Alliance For Competitive Electricity
ALWR	Advanced Light Water Reactor
APPA	American Public Power Association
CRS	Congressional Research Service
EEI	Edison Electric Institute
EPA	Electric Power Alert
EPACT	Energy Policy Act of 1992
FERC	Federal Energy Regulatory Commission
NEI	Nuclear Energy Institution
NLC	National League of Cities
NSBE	National Society of Black Engineers
PUHCA	Public Utilities Holding Companies Act of 1935
PURPA	Public Utility Regulatory Policies Act of 1978
TMI	Three Mile Island
TPPA	Texas Public Power Association
WISE	Washington Internships for Students of Engineering