



Deregulation Impact in Negotiating a  
New Electrical Contract Between  
NASA Glenn Research Center at Lewis Field  
and FirstEnergy Corp., Cleveland, Ohio, U.S.A.

Quyen T. Quach and Laszlo F. Zala  
Glenn Research Center, Cleveland, Ohio

## The NASA STI Program Office . . . in Profile

Since its founding, NASA has been dedicated to the advancement of aeronautics and space science. The NASA Scientific and Technical Information (STI) Program Office plays a key part in helping NASA maintain this important role.

The NASA STI Program Office is operated by Langley Research Center, the Lead Center for NASA's scientific and technical information. The NASA STI Program Office provides access to the NASA STI Database, the largest collection of aeronautical and space science STI in the world. The Program Office is also NASA's institutional mechanism for disseminating the results of its research and development activities. These results are published by NASA in the NASA STI Report Series, which includes the following report types:

- **TECHNICAL PUBLICATION.** Reports of completed research or a major significant phase of research that present the results of NASA programs and include extensive data or theoretical analysis. Includes compilations of significant scientific and technical data and information deemed to be of continuing reference value. NASA's counterpart of peer-reviewed formal professional papers but has less stringent limitations on manuscript length and extent of graphic presentations.
- **TECHNICAL MEMORANDUM.** Scientific and technical findings that are preliminary or of specialized interest, e.g., quick release reports, working papers, and bibliographies that contain minimal annotation. Does not contain extensive analysis.
- **CONTRACTOR REPORT.** Scientific and technical findings by NASA-sponsored contractors and grantees.

- **CONFERENCE PUBLICATION.** Collected papers from scientific and technical conferences, symposia, seminars, or other meetings sponsored or cosponsored by NASA.
- **SPECIAL PUBLICATION.** Scientific, technical, or historical information from NASA programs, projects, and missions, often concerned with subjects having substantial public interest.
- **TECHNICAL TRANSLATION.** English-language translations of foreign scientific and technical material pertinent to NASA's mission.

Specialized services that complement the STI Program Office's diverse offerings include creating custom thesauri, building customized data bases, organizing and publishing research results . . . even providing videos.

For more information about the NASA STI Program Office, see the following:

- Access the NASA STI Program Home Page at <http://www.sti.nasa.gov>
- E-mail your question via the Internet to [help@sti.nasa.gov](mailto:help@sti.nasa.gov)
- Fax your question to the NASA Access Help Desk at 301-621-0134
- Telephone the NASA Access Help Desk at 301-621-0390
- Write to:  
NASA Access Help Desk  
NASA Center for Aerospace Information  
7121 Standard Drive  
Hanover, MD 21076



# Deregulation Impact in Negotiating a New Electrical Contract Between NASA Glenn Research Center at Lewis Field and FirstEnergy Corp., Cleveland, Ohio, U.S.A.

Quyen T. Quach and Laszlo F. Zala  
Glenn Research Center, Cleveland, Ohio

Prepared for the  
Energy Efficiency and Environmental Protection Conference and Exhibition  
sponsored by the Association of Energy Engineers  
Sopron, Hungary, June 13–15, 2001

National Aeronautics and  
Space Administration

Glenn Research Center

## Acknowledgments

We would like to extend our gratitude for the help and support received from the Glenn and FirstEnergy teams in working towards a successful renegotiated contract. The Glenn team members are David Steigman, Ruben DelRosario, Gary Klann, Wayne Lyppert, Don Swedinovich, Robert Suhay, Lou Bernhardt, Tibor Kremic, and Gunnar Zuzan. The FirstEnergy team members are Chuck Fullen, Glenn Pryor, Mike Hardy, and Tammy Singleton.

Available from

NASA Center for Aerospace Information  
7121 Standard Drive  
Hanover, MD 21076

National Technical Information Service  
5285 Port Royal Road  
Springfield, VA 22100

Available electronically at <http://gltrs.grc.nasa.gov/GLTRS>

# **Deregulation Impact in Negotiating a New Electrical Contract Between NASA Glenn Research Center at Lewis Field and FirstEnergy Corp., Cleveland, Ohio, U.S.A.**

Quyên T. Quach and Laszlo F. Zala  
National Air and Space Administration  
Glenn Research Center  
Cleveland, OH 44135

## **Summary**

The governor of the State of Ohio signed amended substitute Senate bill 3 on July 6, 1999, requiring Ohio's electric industry to change from a monopoly environment to a competitive electric environment for generation services. The start date for competitive retail generation services was set for January 1, 2001.

This new deregulation law allowed all Ohioans to choose the supplier of generation service, but the transmission and distribution would remain regulated. It also required electric utilities to unbundle the three main components (generation, transmission, and distribution) and make other changes designed to produce a competitive electric generation market.

While deregulation was taking shape, the NASA Glenn Research Center electrical contract with FirstEnergy Corp. (FE) of Cleveland, Ohio, was to expire on September 7, 1999. Glenn strategically evaluated and incorporated the impacts of electric deregulation in the negotiations. Glenn and FE spent over a year in negotiations until the Glenn utility team and the FE negotiating team came to an agreement in the fall of 2000, and a new contract became effective on January 1, 2001.

## **Introduction**

Glenn Research Center is located in Cleveland, Ohio. The Center, which occupies 350 acres (141.6 hectares) next to the Cleveland Hopkins International Airport, has 177 buildings housing 24 major research facilities. The original investment was about \$483 million in 1941 with an estimated replacement cost in 2000 of slightly above \$1.6 billion.

The ground for the Center was broken on January 23, 1941, for a facility to study piston engines while George W. Lewis was the administrator of National Advisory Committee for Aeronautics. The facility was completed on May 20, 1943, and provided research on aircraft engines and propulsion systems until about 1957. The facility was named the Lewis Flight Propulsion Laboratory when Lewis passed away in 1948.

With the advent of Space Propulsion, Lewis Flight Propulsion Laboratory acquired property near Sandusky, Ohio, to build a nuclear reactor facility for aircraft nuclear propulsion research. Several testing facilities were built with the purchase of 6500 acres (2630 hectares) in 1960, which became known as the Plum Brook Station. President Eisenhower announced in March 1958 the organization of the space agency called National Aeronautics and Space Administration (NASA) replacing the National Advisory Committee for Aeronautics (NACA). The Center became part of NASA and was renamed Lewis Research Center. During the period of 1958 through 1966, Lewis continued as an Aeronautical, Space Propulsion, and Power Research and Development Center providing support to the Mercury and Atlas/Centaur projects.

From the period of 1970's through 1990, Lewis became a center for research, technology and systems development in aeronautical propulsion, space propulsion, space power, microgravity science,

space communication, energy, and related disciplines. During the 1970's, Lewis turned its focus to Earth-based technology. Lewis scientists worked with the Environmental Protection Agency (EPA) in pollution studies of Lake Erie including the investigative process for producing cleaner burning coal. Emphasis on computer analysis became very important for the Center. The 1980's brought new programs such as power systems for the Space Station, the Advanced Turboprop project, and the Advanced Communications Technology Satellite (ACTS).

From the 1990's, Lewis continued to provide research support to aeronautical propulsion, space propulsion, and microgravity systems. However, with the constant reductions in budgets by the Congress of the United States, many Lewis programs have been curtailed, especially in the aeronautics field.

In order to recognize the contributions of Senator/Astronaut John Glenn and Mr. George Lewis, former director of Aeronautical Research for NACA, the Lewis Research Center name was changed by law to the John H. Glenn Research Center at Lewis Field on March 1, 1999.

## **Glenn's Electrical System**

Glenn's electrical system is comparable to a large industrial facility and is served by FirstEnergy Corp. (FE)(previously known as the Cleveland Illuminating Company or CEI). The system is distributed underground to substations where the voltage is transformed. A new substation is being built presently to provide better system reliability and coordination and to upgrade the system to present day standards.

Glenn has a firm demand contract of 21 MW with the utility company. The annual energy cost can vary between \$12 and \$14 million. The fiscal year 2000–2001 estimate for Glenn (from October 1, 2000, to September 30, 2001) was \$13.3 million for the usage of 247 369 MWh.

## **Original Electrical Contract**

CEI had been the main supplier of electrical energy to the Center since it came into existence in 1941. The partnership between the Center and CEI was one of high integrity and good relationship. CEI constantly made an effort to provide the Center with first-class service, respond to its needs, and provide system integrity and reliability with minimal power interruptions. Many contracts went into effect throughout the years. The last contract with CEI (ref. 1) went into effect on September 8, 1989, under the auspices of the Administrator of General Services Administration (GSA), who at the time was acting for the United States of America under the Federal Property and Administration Services Act of 1949.

This contract provided electricity by CEI under a 10-year GSA areawide contract that was to expire on September 7, 1999. Glenn's electricity demand placed it in the "large industrial" rate schedule. However, through many years of prior negotiations a unique rate schedule was established and accepted by the Center, CEI, and the Public Utility Commission of Ohio (PUCO). These special concessions made the text and content of the contract complicated and difficult to understand. During the 10 years that the contract was in effect, the contract saw 36 addendums with the last one taking effect on July 1, 2000. This last addendum extended the existing contract through December 31, 2000.

One of the key elements of the contract was the Firm Contract Demand (FCD), which was 27 MW until October 1, 1991, when it was reduced to 24 MW. One of the contract requirements was that the FCD could be increased by one or more blocks of not less than 3 MW but could be increased above 50 MW. Likewise, upon request by the Center, the FCD could also be reduced in blocks of 3 MW.

The power purchased under the FCD was to provide electricity for the basic institutional building load that included lighting, heating, cooling, and other power required to keep the infrastructure under normal operating conditions. Power purchased for major research activities was above and beyond the FCD, and the contract spelled out exactly how this was to be handled.

In the spring of 1995, the Center initiated a study to reduce the FCD from 24 to 21 MW. From July 1995 to December 1996, the FCD load varied between 21 and 24 MW. CEI notified the Center on January 20, 1997, that they were going on trial basis for the 21 MW FCD and that CEI would review it again at the end of 1997. CEI notified the Center in January 1998 that the trial was over, and they would revert to the 24 MW FCD. The Center challenged CEI to review this reduction because it was felt that this reduction was still revenue neutral for CEI. Once convinced of this, CEI reverted back to the 21 MW FCD on July 1998, which remained in place until the end of the contract. This was also extended in 3-months increments as the new contract came under negotiations. At this point FE became the company that the Center continued to negotiate with (FE became the parent company of CEI, Ohio Edison, Toledo Edison, and Penn Power).

The highlights of the contract with FE for the period of September 1989 to December 2000 were as follows:

Firm contract demand at 21 MW

Firm demand rate is based on FE's Large Industrial Schedule No. 12

Monthly Rates:

|   | <u>Summer</u>          | <u>Winter</u> |
|---|------------------------|---------------|
| Firm kilowatt demand (KWD) billing charge |                        |               |
| For 5 KWD, per kW                         | \$18.79                | \$17.09       |
| For all excess over 5 KWD, per kW         | \$17.40                | \$15.81       |
| Firm kilowatt hour charge, cents per kWh  |                        |               |
| For first 115kWh per KWD                  | included in KWD charge |               |
| For next 305 kWh per KWD                  | 3.64                   | 3.22          |
| For next 130 kWh per KWD                  | 1.17                   | 1.05          |
| For all excess                            | 0.54                   | 0.54          |

Excess energy charge is based on negotiated rates and billed according to a three-period usage:

- (a) On-peak excess period 1: 8 a.m. to 8 p.m.  
Derived by taking the firm electric charges (Firm KWD charge plus firm kWh charge minus substation discount minus supply voltage discount) and dividing by total firm kWh used
- (b) On-peak excess period 2: 8 p.m. to 10 p.m.  
Derived by taking the on peak excess period 1 charge minus 0.2 cents
- (c) Off-peak excess: 10 p.m. to 8 a.m.  
Rate is 0.8 cents per kWh applied to both summer and winter

Other charges include a fuel adjustment charge of 1.39 cents/kWh, which applies to firm kWh charge and excess energy charge, and a PIP recovery charge. Discounts include substation and supply voltage discounts as well as a 4.75 percent return of gross receipt tax. The average cost per kWh that Glenn pays is 5.3 cents.

## **Deregulation History**

After several large holding companies failed in 1935, Congress enacted the Public Utility Holding Company Act (PUHCA). PUHCA brought sweeping changes to the electric power industry. The act broke up the large holding companies and required the combination of their assets into well-defined geographic areas. The holding companies became a single consolidated system and could only conduct

business that was essential for a utility. The Securities and Exchange Commission (SEC) was to regulate the holding companies, and the Federal Energy Regulatory Commission (FERC) was to regulate interstate wholesale marketing and/or transmission companies (ref. 2).

The Federal government greatly expanded its role in electricity generation during the 1930's. Under the New Deal Plan and several other projects, four hydroelectric power plants were built. These were Hoover Dam, Grand Coulee, Tennessee Valley Authority, and Bonneville Project. Along with the power plants came Power Marketing Agencies (PMA) to sell the electricity generated. Today there are 10 Federal entities selling electric power. These federal agencies sell the power at wholesale prices to investor utilities, municipalities, and cooperatives (ref. 3).

An energy crisis hit the country in the 1970's, prompting Congress to enact the Public Utility Regulatory Policies Act of 1978 (PURPA). PURPA allowed nonutility companies to enter the wholesale electric power market if they used cogeneration or other renewable fuel sources. Nonutility companies were defined as companies that own generating capacity and are not regulated under PUHCA. Nonutility companies included qualifying cogenerators, qualifying small power producers, independent power producers, and other nonutility generators without a designated franchise service area (ref. 4). These nonutility companies became known as qualifying facilities (QF).

PURPA required electric utilities to purchase power from QF's at rates regulated by the state regulatory agencies. The rates are based on the avoided marginal cost of the purchasing utility and not on the traditional cost plus a regulated profit. PURPA freed QF's from most FERC, SEC, and state regulations. QF's cannot sell to retail customers and cannot own transmission facilities but are free from geographic restrictions. PURPA opened electric generation and helped independent generators successfully build and run power stations.

Congress acted on electricity regulation again in 1992 with the passage of the Energy Policy Act (EPAAct). This act created a new category of power producer, the exempt wholesale generator (EWG). The EWG's are similar to qualifying facilities because they are exempt from PUHCA, corporate, and geographic restrictions, do not sell to retail customers, and do not own transmission facilities. The EWG's, however, are not required to meet certain cogeneration or renewable fuels limitations, can charge market rates, are not subject to rate regulation, and cannot require utilities to buy their power. EPAAct also allowed FERC to order utilities that owned transmission facilities to provide service to EWG's and QF's.

The FERC issued Orders 888 and 889 in 1996 to encourage wholesale competition. FERC Order 888 required transmission facility owners to offer open-access nondiscriminatory rates (tariffs) and state the terms and conditions to receive the service. Open-access nondiscriminatory rates are those rates the transmission service providers charge themselves for the transmission services. If necessary, the transmission providers have to increase their transmission capacity for those wholesale customers who are willing to share in the expansion costs. FERC Order 888 allows the full recovery of stranded costs.

FERC Order 889 is called the Open Access Same-time Information System rule, which is a price and quote system that gives all users data about the cost of the lines and how much transmission space is available at any given time. The rule requires utilities to administratively separate the wholesale transmission functions from all other activities including marketing, generation, and communication activities (ref. 5). Any company with transmission facilities is required to develop and maintain this open-access, same-time information system. The utilities do not have to divest themselves of their transmission assets.

EPAAct's promotion of wholesale competition has provided the basis for the current dramatic growth in the number of power markets, which are utility and nonutility agents authorized by FERC to sell power at market-based rates. FERC approved 11 power marketers in 1993; by the end of 1994 the number had grown to 53, and electricity sales by power marketers totaled 26 MWh. In 1996, 290 power marketers sold 229.2 million MWh. Sales more than tripled in 1997 when 412 power marketers pushed sales up to 1.2 billion MWh.

The Clinton Administration introduced a "Comprehensive Electricity Competition Plan" on March 27, 1998. The plan is a proposal to implement electricity deregulation on a national level. The major aspects of the proposal (ref. 6) are (1) customer choice, (2) stranded cost recovery,



(3) improved reliability, (4) transmission facility required turnover, (5) standard billing format, (6) required renewable energy sources, (7) establishment of the Public Benefits Fund (stranded benefits), (8) updated Federal electricity laws, and (9) changes to the Internal Revenue Code.

Congressional reaction to the Comprehensive Electricity Competition Plan was mixed. Critics outside of Congress are concerned with the linking of environmental issues and utility restructuring and Internal Revenue Code changes. Long-term implementation of the plan is difficult to predict.

Reference 7 discusses in detail the history of deregulation of the electricity industry in the United States.

## **Ohio Deregulation and Its Impact**

Ohio introduced House bill (HB) 653 on retail wheeling in March 1996 because almost all states were moving towards a deregulated industry. PUCO endorsed an interruptible “buy-through” pilot program that allowed end users to purchase power during capacity shortages from nonlocal utilities. Local utilities were required to buy and resell the electricity to the end users. Legislation on retail competition (HB 220) was reintroduced by Ohio Representative Ron Amstutz in February 1997 that would have provided for full customer choice with provisions for stranded costs by January 1, 1998, but the bill failed to be enacted.

In 1997, State representative Mead and State Senator Johnson coauthored the deregulation bills HB 732 and Senate bill (SB) 237 that would have retail competition implemented by January 1, 2000, with a transition period to last for 5 years. Residential customers that did not select a supplier would be combined into groups of 100,000-200,000 customers. The groups would then be bid out to the least expensive supplier. The major drawback of the bill was the loss of revenue to schools and municipal governments resulting from the 75-percent reduction in personal property tax assessment rate on electric utility-generating equipment. This loss would be supplemented through a kilowatt-per-hour tax on consumers. A lot of modifications to these bills took place during 1998, and among them was to accommodate retail wheeling and modification to the Ohio tax laws in order to maintain utility revenues. This would eliminate advantages to out-of-state suppliers and at the same time, tax utilities at the same rate as other businesses.

Glenn became very concerned with the impact Ohio deregulation would have on the operation of the research facility since there were many problems that the State of California was experiencing in a deregulated market. To plan for deregulation, Glenn attended conferences to get familiar with the deregulation requirements, understand the changes and uncertainties in a regulated market, and strategically plan to take advantage of any benefits that deregulation would bring about. By the time the Governor of the State of Ohio signed the amended substitute SB 3 on July 6, 1999, Glenn knew that something had to be done very soon because its electrical contract was to expire on September 7, 1999. Glenn wanted to continue with a reliable and secure electrical service to keep the research facilities running without any interruptions and wanted to maintain the excellent customer relationship it had with FE.

## **Contract Negotiation Process**

Glenn began informal contract negotiations with FE during the summer of 1999. The first meeting was not scheduled until October 13, 1999, so the existing contract was extended until December 31, 1999. At the October 13 meeting, Glenn presented two objectives: (1) an increase in the contract term from 3 to 5 years and (2) a reduction in the average kWh rate from 5.3 to 3.7 cents. The cost-per-kWh reduction was very important for Glenn to be competitive with two other NASA Centers that had lower rates.

At the second meeting on November 10, 1999, FE offered Glenn real-time pricing (RTP) concept billing, ignoring Glenn’s statement at the first meeting that this was unacceptable. RTP billing is based on

the customer base load (CBL) at 5.27 cents/kWh plus any increase or decrease of usage from CBL at RTP. RTP historically has ranged from 1.5 cents/kWh to \$2/kWh. RTP was to be quoted a day ahead via Internet. One of the requirements of RTP was that Glenn had to be interruptible in an emergency situation with a 10-min notice. There was a potential for savings using this system if Glenn was willing to be flexible in shifting loads with a notice of a day in advance.

This concept was not acceptable to Glenn because of the dynamics of the research operation, planning, and scheduling. Glenn could not take the risk of high rate on short notice because of customer agreements that were made months in advance for the use of Glenn facilities. In addition, Glenn's utility budget is structured and allocated such that it does not allow RTP savings to be put aside in a pool to subsidize future higher rates. This inflexibility does not allow Glenn to be hit by a high rate increase at the end of the fiscal year (which runs from October 1 through September 30).

At the third meeting January 11, 2000, FE was presented with a list of concerns that the Glenn Utility Team put together in November. A major concern was that RTP placed a burden on Glenn personnel because someone had to follow the daily market price. Manpower was not available for this purpose. Also, program schedules were set months in advance and could not be changed on short notice. Additional details were presented to FE with the idea that a fixed-price concept is more desirable to Glenn.

On February 17, 2000, FE offered a modified version of RTP that basically consisted of the RTP with forward pricing. The forward pricing was quoted in advance for up to 11 months, giving Glenn the ability to lock in a price for a specific test for a specific customer. Once committed to this concept, Glenn was obligated to take it or pay for it. This modified version still did not eliminate Glenn concerns about the dynamics of the research operation because tests which are scheduled to run at a specific time could be cancelled or delayed, and under this provision Glenn was obligated to pay for the power purchased in advance regardless of whether it was used or not. Glenn reemphasized to FE one more time that because of the way Glenn operated, it did not allow enough flexibility to take advantage of the RTP or the modified RTP. A fixed rate would be more suitable for Glenn.

Finally, on April 20, 2000, FE came back with a revised offer of a fixed rate for excess power. The proposed new contract was basically a modification of the existing contract. These new contract terms were drawn up based on revenue neutrality if Glenn's operation did not change. The firm power rate was based on rate Schedule No. 13 for large industrial facilities and is set by PUCO. Comparing the new contract with the existing contract, the terms have a high summer excess on-peak rate for the months of June to August, but the winter excess on-peak rate is reduced for the months of September to May. Therefore, savings could be realized if Glenn moved the annual maintenance shutdown from May (low rate) to the first two weeks in June (high rate) and also if research could shift 50 percent of their loads from summer on-peak hours (when rates are high) to shoulder hours, off-peak hours, and/or winter when the rates are lower.

The Glenn team evaluated this revised offer and was in favor of the low rate for winter on-peak excess for 9 months because it placed the Center in a more competitive position when compared with the competition in the research arena. The down side of the offer was the high rate for the summer on-peak excess power for 3 months. The team felt that since the new contract was revenue neutral if Glenn did not change its operation, it provided an opportunity for the impacted parties to adjust to the new contract, and with proper advanced planning, more tests could be scheduled during the winter months or to off-peak hours when the rates are lower.

## **Final Electrical Contract**

A final agreement was reached on June 30, 2000. The contract can be summarized as a modified fixed-price contract with the following provisions: (1) revenue neutrality if Glenn's operation does not change; (2) a firm demand, large industrial rate of 21 MW; (3) a fixed rate for excess energy; (4) a

1-year base contract with options; (5) reuse of the existing GSA contract; and (6) activation of the new contract on January 1, 2001.

FE conducted an analysis using the most recent 12-month load profile based on the terms in the new contract. The results were that (1) if Glenn's annual maintenance shutdown were shifted from May to the first 2 weeks in June, then Glenn would save approximately \$ 78,000 annually; (2) if Glenn were to shift 50 percent of its research loads from the summer months to the winter months, it would save approximately \$ 273,000 annually; (3) the low winter excess on-peak rate for 9 months puts Glenn in a very competitive position; and (4) the terms of the contract are such that they allow Glenn to plan for deregulation.

Additional changes incorporated in the new contract are as follows:

- Summer excess on-peak hours of 8:00 a.m. to 8:00 p.m. were changed to 12 noon to 8:00 p.m.
- Summer excess on-peak rate was changed from 4.7 to 10 cents/kWh.
- Summer excess charges changed from June through September to June through August.
- Summer shoulder hours from 8:00 to 10:00 p.m. were changed to 8:00 a.m. to 12 noon.
- Summer shoulder rate was changed from 4.5 to 5 cents/kWh.
- Winter excess on-peak hours 8:00 a.m. to 8:00 p.m. remained the same.
- Winter excess on-peak rate was changed from 4.5 to 2.7 cents/kWh.
- Winter excess charges changed from October through May to September through May.
- Off-peak hours of 10:00 p.m. to 8:00 a.m. were changed to 8:00 p.m. to 8:00 a.m.
- Summer off-peak rate was changed from 0.84 to 1.5 cents/kWh.
- Winter off-peak rate 0.84 cents/kW remained the same.
- All discounts in existing contract remained the same.
- The 10-year contract was changed to a 1-year base contract with the following Government options:
  - a) extend or renegotiate for 1 more year
  - b) extend or renegotiate for three more years
  - c) return to the spike summer rate

## **Implementation of New Contract**

Table I shows a breakdown of the cost and electrical usage in a comparison between the old and new contracts for the first 2 months since the new contract went into effect on January 1, 2001. Implementing the new contract saved Glenn \$69,600 and \$45,645 in January and February 2001, respectively. Table II presents a comparison of the total electrical cost for each month in 2001 between the old and new contracts. The total savings for the year with the new contract amounted to \$319,585.01. No drastic changes to research operations were required to achieve this, although it is noted that if more testing was moved to third shift, more savings would occur. During this implementation period of the new contract, Glenn sought advice from independent consultants, other utility providers, and the city of Cleveland Office of Aggregation and learned that electric deregulation had not yet evolved fully to support competition and no other providers would be able to provide the benefits FE could. As a result of this, Glenn exercised the option to extend the contract another 36 months, which will not only allow continued savings but will also allow time for the deregulated electric market to fully support competition such that more benefits may be realized in the future.

**TABLE I.—COMPARISON OF ELECTRICAL POWER USAGE AND COST  
BETWEEN OLD AND NEW CONTRACTS**

|  | January 2001  |               | February 2001 |               |
|--|---------------|---------------|---------------|---------------|
|  | Old contract  | New contract  | Old contract  | New contract  |
| <b>Total kWh</b>   | 15 617 059    | 15 617 059    | 13 358 347    | 13 358 347    |
| <b>Net cost for month</b>                                    | \$877,106.85  | \$807,431.02  | \$791,469.85  | \$745,825.25  |
| <b>Unit cost per kWh</b>                                     | \$0.05616     | \$0.05170     | \$0.05925     | \$0.05583     |
| <b>Demand charge</b>   | \$338,410.00  | \$338,410.00  | \$338,410.00  | \$338,410.00  |
| <b>Firm kilowatt-hour charges</b>                            |               |               |               |               |
| Firm usage, kWh  | 11 787 274    | 11 787 275    | 10 669 470    | 10 669 470    |
| Firm cost per kWh  | \$236,187.29  | \$400,266.15  | \$225,660.43  | \$374,179.46  |
| <b>On-peak excess</b>  |               |               |               |               |
| New contract shoulder usage, kWh                             | -----         | 538 347       | -----         | 821 508       |
| New contract shoulder cost per kWh                           | -----         | \$14,785.48   | -----         | \$22,558.61   |
| Usage, kWh   | 3 084 043     | 2 545 605     | 2 450 301     | 1 628 793     |
| Cost per kWh   | \$138,781.94  | \$69,902.31   | \$110,263.55  | \$44,726.66   |
| Old contract shoulder kWh used                               | 600 000.00    | -----         | 185 000       | -----         |
| Old contract shoulder cost per kWh                           | \$25,800.00   | -----         | \$87955.00    | -----         |
| <b>Off-peak excess</b>                                       |               |               |               |               |
| Usage, kWh   | 145 742       | 745 742       | 53 576        | 238 576       |
| Cost per kWh   | \$1,224.23    | \$6,264.23    | \$450.04      | \$2,004.04    |
| <b>Fuel adjustment</b>                                       |               |               |               |               |
| Charge added to all excess kWh used                          | -----         | \$53,302.93   | -----         | \$37,423.79   |
| Charge applied to total kWh used                             | \$217,358.23  | -----         | \$185,921.47  | -----         |
| <b>Demand deficiency</b>                                     |               |               |               |               |
| Deficiency, kWh  | 0             | 0             | 1 552         | 1 552         |
| Deficiency charge  | \$0.00        | \$0.00        | \$232.80      | \$232.80      |
| <b>Discounts</b>   |               |               |               |               |
| Consumer's substation  | (\$6,300.00)  | (\$6,300.00)  | (\$6,300.00)  | (\$6,300.00)  |
| Supply voltage   | (\$37,800.00) | (\$37,800.00) | (\$37,800.00) | (\$37,800.00) |
| <b>Other charges</b>   |               |               |               |               |
| PIP recovery charge  | \$7,185.41    | -----         | \$6,146.18    | -----         |
| Universal service charge                                     | -----         | \$7,185.41    | -----         | \$6,146.18    |
| Temporary energy efficiency                                  | -----         | \$1,680.08    | -----         | \$1,437.09    |
| <b>Gross amount</b>  | \$920,847.10  | \$847,696.59  | \$830,939.47  | \$783,018.63  |
| Special discount 4.75 percent<br>kWh tax (as of May 1, 2001) | (\$43,740.24) | (\$40,265.59) | (\$39,469.62) | (\$37,193.38) |
| <b>Grand net cost</b>  | \$877,106.86  | \$807,431.00  | \$791,469.85  | \$745,825.25  |
| <b>Difference in contract cost</b>                           |               | \$69,675.86   |               | \$45,644.60   |

**TABLE II.—ELECTRICAL COST COMPARISON BETWEEN  
OLD AND NEW CONTRACTS FOR 2001**

| Year 2001                    | Old Contract  | New Contract  | Savings      |
|------------------------------|---------------|---------------|--------------|
| January                      | \$ 877,106.86 | \$ 807,431.00 | \$ 69,675.86 |
| February                     | 791,469.85    | 745,825.25    | 45,644.60    |
| March                        | 929,532.93    | 853,699.66    | 75,833.27    |
| April                        | 1,039,325.82  | 951,728.27    | 87,597.55    |
| May                          | 1,005,416.25  | 926,278.83    | 79,137.42    |
| June                         | 730,106.55    | 755,090.79    | (24,984.24)  |
| July                         | 858,822.73    | 953,144.66    | (94,321.93)  |
| August                       | 985,547.69    | 1,215,334.91  | (229,787.22) |
| September                    | 949,859.14    | 873,272.89    | 76,586.25    |
| October                      | 837,921.85    | 775,693.18    | 62,228.67    |
| November                     | 766,462.98    | 714,763.45    | 51,699.53    |
| December                     | 965,752.95    | 845,477.70    | 120,275.25   |
| <b>Total Savings in 2001</b> |               |               | \$319,585.01 |

## Conclusion

The present electrical contract with FirstEnergy Corp. (FE) provides the NASA Glenn Research Center with a period of stability while deregulation goes into full force in Ohio. It allows Glenn to establish new strategies in order to reduce consumption and energy cost. It is important for Glenn to have electric power reliability from FE because the uncertainties and challenges confronting utilities in a competitive environment could cause havoc when it comes to transmitting large amounts of power from far away places not knowing if the transmission grid can support over 200 MW of electrical power required when Glenn is running large wind tunnels.

This contract provides an opportunity for Glenn and FE to see how deregulation transpires in Ohio, what benefits or pitfalls there will be for large industrial facility users, and also whether it will bring a repeat of the troubles and nightmares that occurred in the State of California. Glenn must be supplied with a reliable power system, power quality, minimal or zero power interruptions, and a reasonable energy cost in order to be competitive in the research arena.

## References

1. Quach, Quyen T.: Report on Electrical Contract Re-Negotiation Between GRC and FirstEnergy. 2000.
2. Historical Overview of the Electric Power Industry. [http://www.eia.doe.gov/cneaf/electricity/chg\\_stru\\_update/chapter2.html](http://www.eia.doe.gov/cneaf/electricity/chg_stru_update/chapter2.html) Accessed Jan. 31, 2002.
3. History of the U.S. Electric Power Industry, 1882-1991. [http://www.eia.doe.gov/cneaf/electricity/chg\\_stru\\_update/appa.html](http://www.eia.doe.gov/cneaf/electricity/chg_stru_update/appa.html) Accessed Jan. 31, 2002.
4. Restructuring Matrix: How Federal Bills Address Electric Utility Restructuring Issues. <http://www.naruc.org/Congressional/1998/matrix.html> Accessed Jan. 31, 2002.
5. Abel, Amy; and Parker, Larry: IB10006: Electricity: The Road Toward Restructuring. <http://cnie.org/NLE/CRSreports/energy/eng-7.cfm> Accessed Apr. 10, 2002.
6. Comprehensive Electricity Competition Plan, 1998. <http://www.energy.gov/> Accessed Jan. 31, 2002.
7. Electricity Deregulation Planning for NASA Facilities in Ohio and New Mexico. Enviro-Management & Research, Arlington, VA, 1999.

# REPORT DOCUMENTATION PAGE

*Form Approved*  
*OMB No. 0704-0188*

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

|   |   |  |  |  |
|---|---|--|--|--|
| <b>1. AGENCY USE ONLY</b> ( <i>Leave blank</i> )  |   | <b>2. REPORT DATE</b><br>August 2002                           | <b>3. REPORT TYPE AND DATES COVERED</b><br>Technical Memorandum                  |  |
| <b>4. TITLE AND SUBTITLE</b><br>Deregulation Impact in Negotiating a New Electrical Contract Between NASA Glenn Research Center at Lewis Field and FirstEnergy Corp., Cleveland, Ohio, USA  |   |  | <b>5. FUNDING NUMBERS</b><br><br>WU-772-20-02-02                                 |  |
| <b>6. AUTHOR(S)</b><br><br>Quyên T. Quach and Laszlo F. Zala  |   |  |  |  |
| <b>7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)</b><br><br>National Aeronautics and Space Administration<br>John H. Glenn Research Center at Lewis Field<br>Cleveland, Ohio 44135-3191  |   |  | <b>8. PERFORMING ORGANIZATION REPORT NUMBER</b><br><br>E-13189                   |  |
| <b>9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)</b><br><br>National Aeronautics and Space Administration<br>Washington, DC 20546-0001  |   |  | <b>10. SPONSORING/MONITORING AGENCY REPORT NUMBER</b><br><br>NASA TM-2002-211367 |  |
| <b>11. SUPPLEMENTARY NOTES</b><br><br>Prepared for the Energy Efficiency and Environmental Protection Conference and Exhibition sponsored by the Association of Energy Engineers, Sopron, Hungary, June 13-15, 2001. Responsible person, Laszlo F. Zala, organization code 7511, 216-433-8827.  |   |  |  |  |
| <b>12a. DISTRIBUTION/AVAILABILITY STATEMENT</b><br><br>Unclassified - Unlimited<br>Subject Categories: 81, 83, and 89<br>Available electronically at <a href="http://gltrs.grc.nasa.gov/GLTRS">http://gltrs.grc.nasa.gov/GLTRS</a><br>This publication is available from the NASA Center for AeroSpace Information, 301-621-0390.   |   |  | <b>12b. DISTRIBUTION CODE</b>  |  |
| <b>13. ABSTRACT</b> ( <i>Maximum 200 words</i> )<br><br>The governor of the State of Ohio signed amended substitute Senate bill 3 on July 6, 1999, requiring Ohio's electric industry to change from a monopoly environment to a competitive electric environment for generation services. The start date for competitive retail generation services was set for January 1, 2001. This new deregulation law allowed all Ohioans to choose the supplier of generation service, but the transmission and distribution would remain regulated. It also required electric utilities to unbundle the three main components (generation, transmission, and distribution) and make other changes designed to produce a competitive electric generation market. While deregulation was taking shape, the NASA Glenn Research Center electrical contract with FirstEnergy Corp. of Cleveland, Ohio, was to expire on September 7, 1999. Glenn strategically evaluated and incorporated the impacts of electric deregulation in the negotiations. Glenn and FirstEnergy spent over a year in negotiations until the Glenn utility team and the FirstEnergy negotiating team came to an agreement in the fall of 2000, and a new contract became effective on January 1, 2001. |   |  |  |  |
| <b>14. SUBJECT TERMS</b><br><br>Commercial energy; Electric power; Industrial energy; Energy conservation   |   |  | <b>15. NUMBER OF PAGES</b><br>15   |  |
|   |   |  | <b>16. PRICE CODE</b>  |  |
| <b>17. SECURITY CLASSIFICATION OF REPORT</b><br>Unclassified  | <b>18. SECURITY CLASSIFICATION OF THIS PAGE</b><br>Unclassified | <b>19. SECURITY CLASSIFICATION OF ABSTRACT</b><br>Unclassified | <b>20. LIMITATION OF ABSTRACT</b>  |  |