



Electric Reliability in Deregulated Markets: A Look at the ERO

By

**Rick Cordaro
Iowa State University**

**WISE 2001 Intern
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ABOUT THE AUTHOR

Rick Cordaro is a senior in electrical engineering with minors in mathematics and entrepreneurial studies at Iowa State University. He is specializing in communications and signal processing and will graduate in May 2003.

ABOUT WISE

The Washington Internships for Students of Engineering (WISE) program annually selects fourteen to sixteen outstanding students, entering their final year of undergraduate study, through a nation-wide competition, to spend ten weeks in the summer in Washington, D.C. During the internship, students learn how government officials make decisions on complex technological issues and how engineers can contribute to legislative and regulatory public policy decisions. Meetings with congressional committees, executive office departments, and corporate government affairs offices are daily activities. The internship culminates with a presentation and paper the student produces on an important engineering-related public policy issue. For more information, see <http://www.wise-intern.org/>.

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ABSTRACT

Electric reliability in the United States is in a period of flux. Electric utility restructuring and deregulation have created a unique challenge for the industry – what is the best way to create and enforce standards for reliability? The most recognized solution is the formation of a national electric reliability organization (ERO). The proposed ERO would be an independent, self-regulatory organization backed by the federal government. The organization would be impartial, technically competent, and have the legal authority to establish and enforce reliable planning and operating standards for the electric system. This paper will discuss the history, structure, and current discussion surrounding the North American Electric Reliability Organization.

INTRODUCTION

The computer chip industry is so sensitive to electric interruptions that, without a battery backup, even a 1/60th of one-second interruption can cause enough voltage sag to render a silicon device worthless during the manufacturing cycle. In fact, a CNN report estimates that about \$5 million a day is lost on a 10 second interruption because the whole system has to be shut down and realigned.¹ This case is just one example of how critical electric reliability is to our nation, its industry, and its people. Additionally, the current trend in electric industry restructuring and deregulating is making the situation a lot more interesting, especially in the Western United States.

It's no secret that reliability has been an issue in California, who deregulated markets in 1998. Reliability assessments agree that, for the summer of 2001 in California, electricity demand will exceed supply capability and rotating electrical outages will be required. The estimates of

¹ Chowdhury, Badrul H. "Power Quality." IEEE Potentials. April/May 2001. Vol. 20, No. 2: 5-11.

electricity outages in California during the summer 2001 (June 1 through September 30) range from a low of 55 hours to a high of 700 hours.²

These outages unarguably demonstrate a lack of reliability, but reliability can mean different things to different people. For the residential consumer it could mean, “Does the light come on when I flip the switch?” or, “Does a small surge reboot my computer?”³ An agreed upon definition of reliability will facilitate a discussion.

In the bulk power system – the aggregate of generating facilities, transmission lines, and related equipment – reliability is how well the system performs in delivering electricity to the consumer in the amount desired and within certain standards. The two basic functional aspects of the bulk power system are adequacy and security. “Adequacy is the ability of the bulk power electric system to supply the aggregate electric power and energy requirements of the consumers at all times, taking into account scheduled and unscheduled outages of the system components.

Security is the ability of the bulk power system to withstand sudden disturbances such as electric short-circuits or an unanticipated loss of system components.”⁴ The definition of reliability is important but it only serves to explain a small part of how a reliable electric system works.

Experts debate over whether reliability is a public good, a product attribute, or a commodity.

Other experts believe these are buzzwords that are misleading and, in fact, reliability is based on system attributes. For example, cars have many systems and a car’s reliability is based on the

² Electricity Shortage in California: Issues for Petroleum and Natural Gas Supply. Energy Information Administration, U.S. Department of Energy. 12 Jun. 2001
<<http://www.eia.doe.gov/emeu/steo/pub/special/california/june01article/casummary.html>>.

³ Cook, David N. Testimony before the United States Senate Committee on Governmental Affairs. 28 Jun 2001.

⁴ Abel, Amy. Electric Utility Restructuring Briefing Book: Reliability. Congressional Research Service. 13 Oct. 2000.

proper function of these systems in concert with one another. The same is true in electricity where, to the customer, the system either works or it doesn't. Finally, now that reliability has been defined, it can be measured. One way to do that is in terms of the impact to society of an outage: what was the magnitude of the outage, what is the frequency of outages and what is the duration of the interruption?⁵ These things are notable because of their societal impact.

All of the market changes going on today will potentially affect large numbers of people. The general public relies on electricity to maintain their standard of living, convenience, and safety. Engineers base their careers on harnessing the power of electricity. The policy community is obligated to watch out for the public and meet their need for electricity. Business interests are at stake as companies and utilities risk large sums of money to enter electricity markets or adapt to market changes. No one is left untouched because the structure of the industry may have a lot to do with reliability.

HOW THE INDUSTRY WORKS

Providing electricity to a consumer is essentially three parts: generation, transmission, and distribution. Generation consists of converting energy to a useful form, namely electricity. Transmission is the process of moving high voltage electricity from a generator to a distribution facility. Distribution is the local wires, transformers, substations, and other equipment that deliver electricity to consumers from the high voltage transmission lines.⁶

⁵ Casazza, Jack. Personal Interview. 27 Jun. 2001.

⁶ Three Parts of Electric Service. Pennsylvania Electric Choice Program. 12 Jun. 2001
<<http://www.electrchoic.com/public/3parts.html>>.

Until recently, the business of providing electricity service was seen as a natural monopoly meaning there is an inherent tendency toward declining long-term costs (once a power plant is built, it is a relatively minimal investment to produce power), there is a high threshold investment (power plants are expensive), and technological conditions exist that limit the number of potential entrants (it would be silly to have multiple sets of power lines to each home).⁷ In recent years, however, people's perceptions of electricity as a natural monopoly have faded. One industry insider has said, "As in so many other regulated monopolies, technological developments have overtaken and destroyed the rationale for regulation. Electricity generation is no longer a natural monopoly."⁸ Transmission and distribution (T&D) are still considered natural monopolies and are still regulated.

After other industries that were once considered natural monopolies such as the airlines, securities and banking businesses, trucking, natural gas, and telecommunications industries were deregulated, the focus turned to electricity. Now, almost half of the states in the U.S. have restructured their electric power industry in some form. State officials hoped deregulation would bring about competitiveness and result in lower retail prices. Unfortunately, this has not always been true and, because of a wide range of issues ranging from price controls to a lack of supply, electric reliability is no longer a guarantee. Examining the differences between the old and new systems can help show why reliability is an issue.

⁷ Abel, Amy and Parker, Larry. Electricity: The Road Toward Restructuring. CRS Issue Brief. Congressional Research Service. 30 May 2001.

⁸ Powering a Generation of Change. Smithsonian Institution. 4 Jun 2001
<<http://americanhistory.si.edu/csr/powering/>>.

Prior to deregulation, electric utilities were a vertically integrated business, meaning the utility controlled every aspect of generation, transmission, and distribution in their local area. State utility commissions monitored these for-profit organizations and ensured that they provided service to everyone at reasonable rates. Rates were based on the cost of service with a small profit margin. Reliability and profitability weren't in competition because the utilities could upgrade their facilities and pass the cost on to the consumer, as long as the state utility commissions agreed. An organization known as the North American Electric Reliability Council (NERC), oversaw reliability, but participation was voluntary and there was no mechanism for enforcement.⁹

When the federal and state governments opened the doors for deregulation, the functions of generation, transmission, and distribution were separated. Generation became deregulated so that anyone could enter the industry and prices were essentially set based on the market principles of supply and demand. Basically, generators dump power on to the electric grid, which is now operated (but not owned) by an Independent System Operator. The ISO controls the flow of power and balances the load in order to make sure power gets where it needs to be. In many cases, utilities still generate their own power, but may now buy and/or sell power to other utilities and commercial, industrial, and residential consumers. T&D are still regulated and the utilities that own the power lines are required to allow all electricity generators access. Ultimately, the main differences between a regulated and deregulated market is that the utilities

⁹ Powering a Generation of Change. Smithsonian Institution. 4 Jun 2001
<<http://americanhistory.si.edu/csr/powering/>>.

don't necessarily generate electricity and customers may purchase power from their choice of generator (a diagram of the industry structures is available in Appendix B).¹⁰

The new rules under which generators exercise their profit motives are not always conducive to reliable service. In areas where there isn't an abundance of generation, it may be to a generator's advantage to withhold supply to drive prices up. It is expensive to provide rural customers service so the utilities may neglect these individuals who were once guaranteed service. Also, because facility maintenance is expensive and can often be deferred to reduce generation costs and increase the margin between cost and retail price, experts are concerned that generators will focus too much on making money and not enough on electric reliability. These problems have led the industry to seek a new solution to ensure adequate and secure electric supplies.

ENSURING RELIABILITY IN A DEREGULATED MARKET

What solutions are available to ensure reliability? Experts, regulators, legislators, and industry leaders recognize a few options: FERC, the Federal Energy Regulatory Commission, could step in; price caps could be used where markets have failed; supply and demand management techniques could be implemented as needed; an electric reliability organization (ERO) could be created to oversee reliability in the market place. What is the best option?

Nearly everyone agrees that the first choice won't work. FERC lacks jurisdiction over approximately one-third of the transmission facilities in the United States including utilities within the Electric Reliability Council of Texas, rural electric cooperatives that have Rural

¹⁰ Powering a Generation of Change. Smithsonian Institution. 4 Jun 2001
<<http://americanhistory.si.edu/csr/powering/>>.

Utility Service financing, the Federal power marketing administrations (such as the Bonneville Power Administration and the Western Area Power Administration), the Tennessee Valley Authority, and facilities owned by municipalities and state agencies.¹¹ Also, according to FERC, the Commission may not regulate retail sales or local distribution of electricity. The Federal Power Act leaves those matters to the states. The Commission doesn't have a role in authorizing the construction of new generation facilities (other than non-federal hydroelectric facilities) or transmission facilities either. These are state or local responsibilities.¹²

Price caps do not allow the “invisible hand” of a free market to control prices and are usually seen as a temporary fix to serious, unexpected problems. Price caps are not a viable long-term solution. Supply and demand management are important factors to the electric industry but are not necessarily guarantees of anything, especially reliability. According to the Institute for Electrical and Electronics Engineers, it is clear that neither FERC nor the energy market participants and academic experts working in isolation have a sufficient understanding at this time to address all the reliability problems that have been created by restructuring.¹³ The remaining option is to have an organization develop and enforce mandatory reliability standards.

According to the Bush Administration, one important factor limiting reliability is the lack of enforceable reliability standards. As mentioned, the standards in place are voluntary and it is recognized that this is no longer a viable approach in a competitive market. In fact, the President's energy policy group recommends “the President direct the Secretary of Energy to

¹¹ Cook, David N. Testimony before the United States Senate Committee on Governmental Affairs. 28 Jun 2001.

¹² 2000 Annual Report. Federal Energy Regulatory Commission.

¹³ Sauthoff, Ned R. Letter to Office of Policy, United States Department of Energy. 2 Jan. 2001
<<http://www.ieeeusa.org/FORUM/POLICY/01jan02.html>>.

work with FERC to improve the reliability of the interstate transmission system and to develop legislation providing for enforcement by a self-regulatory organization subject to FERC oversight.”¹⁴

The Institute for Electrical and Electronics Engineers agrees saying “to be effective the existing arrangement of voluntary compliance with industry reliability rules needs to be transformed into a self-managing electric reliability organization that must be buttressed by federal legislation and the ability to provide both financial incentives and penalties that lead to compliance with appropriate industry consensus reliability standards.”¹⁵ In essence, the voluntary system wasn’t designed with deregulation in mind.

David Cook, General Counsel for NERC, testified before the United States Senate saying

NERC’s voluntary system of the past thirty years will no longer work because:

- The grid is now being used in ways for which it was not designed.
- There has been a quantum leap in the number of hourly transactions, and in the complexity of those transactions.
- Transmission providers and other industry participants that formerly cooperated willingly are now competitors.
- Rate mechanisms that in the past permitted utilities to recover the costs of operating systems reliably are no longer in place, or are inadequate given increased risks and uncertainties.
- The single, vertically integrated utility that formerly performed all reliability functions for an area is being disaggregated, meaning that reliability responsibilities are being divided among many participants.
- Some entities appear to be deriving economic benefit from bending or violating the reliability rules.
- Construction of additional transmission capacity has not kept pace with either the growth in demand or the construction of new generating capacity, meaning the existing grid is being used much more aggressively.

¹⁴ Cheney, Dick. Report of the National Energy Policy Development Group. Office of the Vice President of the United States. Washington: GPO 2001.

¹⁵ Sauthoff, Ned R. Letter to Office of Policy, United States Department of Energy. 2 Jan. 2001 <<http://www.ieeeusa.org/FORUM/POLICY/01jan02.html>>.

NERC, a not-for-profit organization, was formed after the Northeast blackout in 1965. Its goal is to promote the reliability of the bulk electric systems that serve North America.¹⁶ However, because of industry restructuring, NERC is moving through a process of change and in 1997, NERC formed an Electric Reliability Panel that charted a course for the development of an ERO.¹⁷

The 1997 NERC panel recommended creating an independent, self-regulatory electric reliability organization that would be backed by the governments in both Canada and the United States. The organization would be designed to be impartial, technically competent, and should have the legal authority and respect of the participants to establish and enforce reliable planning and operation standards for the electric systems.¹⁸ NERC has taken the panel's advice, is lobbying for adoption of the concept of an ERO, and is positioning to become the North American Electric Reliability Organization (NAERO).

The Reliability Panel also concluded that enforcing this proposed reliability system would require federal legislation in the United States. Without an act of Congress, the new reliability organization wouldn't have the teeth to enforce its policies. Upon inspection, it would seem FERC could create an ERO, but FERC's capacity to deal with reliability is limited by a lack of jurisdiction over the matter and some of the market players. The panel also believes that FERC lacks the technical expertise.¹⁹ The IEEE agrees maintaining that FERC does not have the

¹⁶ Cook, David N. Testimony before the United States Senate Committee on Governmental Affairs. 28 Jun 2001.

¹⁷ [Transition to NAERO](http://www.nerc.com/about/naero.html). 13 Jun. 2001 <<http://www.nerc.com/about/naero.html>>.

¹⁸ [Transition to NAERO](http://www.nerc.com/about/naero.html). 13 Jun. 2001 <<http://www.nerc.com/about/naero.html>>.

¹⁹ [Transition to NAERO](http://www.nerc.com/about/naero.html). 13 Jun. 2001 <<http://www.nerc.com/about/naero.html>>.

authority to deal with reliability and that Federal legislation is needed.²⁰ As recently as June 18th, 2001, the NERC called for federal legislation to put the principle of mandatory reliability rules created and enforced by a national organization into practice.²¹

PROBLEMS AND SOLUTIONS

NAERO is trying to solve a problem that stems from the new configuration of the market after deregulation. The pressure of market forces confronts the voluntary approaches to reliability oversight, and participation in a deregulated market must be mandatory to induce cooperation.²² According to Bruce Radford, Editor-in-Chief of *Public Utilities Fortnightly*, “under the old scheme, you had heavy regulation of prices coupled with laissez faire oversight for reliability. NERC called it ‘peer pressure.’ Under competition, however, it’s just the opposite: laissez faire prices with intensely regulated reliability.”²³ Radford also notes, however, that reliability rules have serious implications for competition, and no one seems able to draw the line between the two. Whenever someone proposes or endorses a reliability standard, there is a flurry of protests from companies like Mirant, Enron, Dynegy, Reliant, Calpine, etc.²⁴ They protest because reliability is expensive to guarantee, results in different expenditure levels for different companies, and failure to provide reliability opens the door to litigation. These protests will be inevitable, and every NAERO-approved reliability rule will probably be appealed to FERC,

²⁰ Sauthoff, Ned R. Letter to Office of Policy, United States Department of Energy. 2 Jan. 2001 <<http://www.ieeeusa.org/FORUM/POLICY/01jan02.html>>.

²¹ Gent, Mike Letter to the Honorable Spencer Abraham, Secretary of the United States Department of Energy. 18 Jun. 2001 <ftp://www.nerc.com/pub/sys/all_updl/docs/legislative/Abraham-letter-061801.pdf>.

²² 2000 Energy Symposium. 24 May 2000. Washington, DC: Institute of Electrical and Electronics Engineers, 2000.

²³ Radford, Bruce W. “Shallow Turf.” Public Utilities Fortnightly 1 Oct. 1998: 4-6.

²⁴ Radford, Bruce W. “Re: NERC to NAERO.” E-mail to the author. 26 Jun. 2001.

which will be asked to make the final say, after giving consideration to market concerns. This defeats the purpose of having a NAERO in the first place.²⁵

So then, what exactly is NAERO trying to become?

“NAERO’s aim is to become the certified Self-Regulating Reliability Organization (SRRO) for the North American power industry. This SRRO will, in turn, assure the government that interconnections will be operated fairly and with acceptable reliability via set reliability standards. Compliance will be backed up by the regulatory agencies [FERC], with the actual implementation of the standards by delegated Regional Reliability Organizations (RROs), which will also solicit input from stakeholders and the general public... At present, NAERO does not have the power to levy fines – but in a program of simulated enforcement, if a company is caught out of compliance, the amount of a potential fine will be made known. However, money is not the object in this program.”²⁶

Unfortunately, this is a vague definition and does not imply any of the consequences of such an organization. However, the concept appeals to a wide variety of industry organizations, including the American Public Power Association (APPA), the Electric Power Supply Association (EPSA), Electricity Consumers Resource Council (ELCON), the National Rural Electric Cooperative Association (NRECA), Enron Corp., and others.²⁷ The Electric Power Research Institute, a non-profit research consortium serving more than 1000 energy related organizations in 40 countries agrees.²⁸ They have supported the proposed creation of an ERO to develop and enforce mandatory reliability rules.

The Canadian Electricity Association, Institute for Electrical and Electronics Engineers-USA, the Large Public Power Council, the National Association of Regulatory Utility Commissioners, the

²⁵ Radford, Bruce W. “Re: NERC to NAERO.” E-mail to the author. 26 Jun. 2001.

²⁶ 2000 Energy Symposium. 24 May 2000. Washington, DC: Institute of Electrical and Electronics Engineers, 2000.

²⁷ Need for Legislative Action. 13 Jun. 2001 <<http://www.naero.org/legislation.html>>.

²⁸ Power Delivery News. Electric Power Research Institute. Jun. 2001.

National Association of State Energy Officials, the National Association of State Utility Consumer Advocates, the National Electrical Manufacturers' Association, the Northwest Regional Transmission Association, the Transmission Access Policy Study Group, and the Western Interconnection Coordination Forum also sign off on the concept.²⁹

Edison Electric Institute, the trade association for the industry representing investor owned utilities, agrees. According to Mike Oldak, Director, State Competitive and Regulatory Policy, most EEI members buy off on the concept of NAERO.³⁰ EEI also officially supports the passage of federal reliability legislation that would create NAERO.³¹

Additionally, in a 2000 report, the United States Department of Energy Power Outage Study Team (POST) recommended, "Mandatory standards for bulk-power systems are needed to ensure that the 'rules of the road' are implemented in a straightforward and balanced manner." The POST team supports the creation of a self-regulated reliability organization through federal action with FERC oversight to develop and enforce reliability standards as part of a comprehensive plan for the restructured electric industry.³²

ORGANIZATIONAL STRUCTURE

What then is the difference between having a mandatory ERO and having a regulated market?

Mike Oldak, EEI, states that the key difference between a reliability organization and a regulated

²⁹ Cook, David N. Testimony before the United States Senate Committee on Governmental Affairs. 28 Jun 2001.

³⁰ Oldak, Mike. "Presentation to WISE 2001: Restructuring in the States and the California Situation." Edison Electric Institute, Washington, DC. 19 Jun. 2001.

³¹ Owens, David K. "Comments of the Edison Electric Institute on Electric Reliability Issues." 3 Jan. 2001 <http://www.eei.org/edg/reliability/doe_010103.pdf>.

³² Report of the U.S. Department of Energy's Power Outage Study Team. Mar. 2000 <<http://www.policy.energy.gov/electricity/postfinal.pdf>>.

market is the idea of a policing. Instead of controlling the market, as in regulation, a structure is set up so players can act as they wish while meeting a set of requirements. As long as the electric industry meets these requirements, they may operate without government intervention.³³ This is a drastic change and prompts questions about the powers the reliability organization should have.

NERC believes NAERO should develop industry standards and define sanctions for violations although NAERO will not produce standards for business practices.³⁴ This goes back to setting up a framework for the industry rather than controlling the industry's business operations. According to NERC documents, they have taken steps in a transition to a new electric reliability organization that will set and enforce mandatory reliability standards for the bulk power system, in anticipation of passage of legislation in the United States.³⁵

To do this, a ten-member independent Board of Trustees will govern NAERO replacing NERC's current 47-member mixed (independents and stakeholders) board. Non-independent Trustees become initial members of a Stakeholders Committee. They will elect the independent trustees, vote on amendments to the bylaws, participate in the budget process, provide advice and recommendations to the Board, and develop recommendations for the composition, governance, and voting of a more inclusive stakeholders group. Then, the ten Regional Reliability Councils (see map in Appendix C) will remain as NAERO's only members to approve changes to the

³³ Oldak, Mike. "Presentation to WISE 2001: Restructuring in the States and the California Situation." Edison Electric Institute, Washington, DC. 19 Jun. 2001.

³⁴ Gent, Mike. Personal interview. 19 Jun. 2001.

³⁵ NERC to NAERO Transition: Background. 25 Jun. 2001 <<http://www.nerc.com/naero/background.html>>.

corporate charter, participate in the budget process, and have the authority to amend the bylaws.³⁶ Besides making rules, NAERO will have to enforce them.

In order to enforce compliance, NERC proposes an agreement between NAERO and the Regional Reliability Councils whereby each council develops a contract-based compliance and enforcement program that includes monetary penalties and other sanctions, with its members. NAERO will oversee the development, coordinate the implementation, and assess the effectiveness of the regional compliance and enforcement programs.³⁷ Based on these ideas, it would appear as though the regional councils have a significant amount of independence and authority in the process.

NERC asserts that the rules will be developed and enforced by the people with the technical expertise to oversee the running of the high-voltage interstate electric transmission grid and by those who use it. FERC would perform an appellate role in the case of disputes that cannot be resolved by the ERO itself.³⁸

Not everyone is convinced that such a structure will work. Some believe that NAERO can't regulate reliability because reliability depends on the laws of physics. The electric grid is a complex system that doesn't care about agreements or standards. Opponents of an ERO attest that the current NERC board has no technical competence and that members were picked for their commercial neutrality. These same people argue that engineers have to be involved more so than policy makers. One suggestion is a real-time analysis system to be monitored and

³⁶ NERC to NAERO Transition: Background. 25 Jun. 2001 <<http://www.nerc.com/naero/background.html>>.

³⁷ NERC to NAERO Transition: Background. 25 Jun. 2001 <<http://www.nerc.com/naero/background.html>>.

³⁸ NERC to NAERO Transition: Frequently Asked Questions. 1 Jul. 2001 <<http://www.naero.org/faq.html>>.

enforced by the system operators. Ultimately, this is the ISOs/RTOs and the local companies who operate the electric equipment, not NAERO.³⁹ ISOs are independent companies who operate the electric grid and RTOs are voluntary groups of transmission owners who work with FERC on related issues.

Bruce Radford agrees saying that with NAERO, “logic collides with politics.” NERC is trying to avoid any appearance that it will simply duplicate the regional ISOs, so it unveiled NAERO as a top-down institution to enforcing national standards. But NAERO would also make room for the regional reliability organizations. Radford asks if NAERO is truly national, why create regional organizations that seem redundant of the regional ISOs?⁴⁰ It would seem that the ISO's/RTO's would be better suited for standard setting and enforcement, because they are the place where reliability and the commercial practices come together. Hence, the ISOs/RTOs have the advantage of being able to see reliability and commercial practices simultaneously, and of being able to tweak each piece at the same time to reach a consensus. “The process would be much more dynamic than you would have at NERC/NAERO.”⁴¹

FERC’s strategic plan alludes to something similar and expects regional bodies such as RTOs will be the primary institutions for dealing with market participants directly. FERC believes that RTOs must develop throughout the Nation to promote competition while maintaining reliability. According to the plan, FERC “will play a role in advising new institutions on designing their

³⁹ Casazza, Jack. Personal Interview. 27 Jun. 2001.

⁴⁰ Radford, Bruce W. “Shallow Turf.” Public Utilities Fortnightly 1 Oct. 1998: 4-6.

⁴¹ Radford, Bruce W. “Re: NERC to NAERO.” E-mail to the author. 26 Jun. 2001.

self-monitoring processes and in approving operational changes as regional markets develop.”⁴²
By this statement, it would seem FERC sees no urgent need for NAERO.

NERC replies to that by saying under the “NERC consensus reliability legislation, the ERO would set and enforce rules for the reliable operation of the bulk power system. The ERO would also report on the adequacy of generation capacity and the interconnected transmission system, and make recommendations for needed improvements.” Under the legislative proposal RTOs are classified as system operators and would be required to be members of the ERO and any affiliated regional reliability entity. “As such, RTOs would be obligated to comply with mandatory reliability standards. This is consistent with FERC’s expectation that RTOs would conform their behavior to standards set by a separate standard setting and enforcing organization for reliability matters.”⁴³

The point NERC is trying to make is that RTOs, ISOs and NAERO can all coexist. Based on the arguments presented, this would appear to be true. ISOs would continue to operate the grid following the standards set and enforced by NAERO. The RTOs would be a regional mechanism for organizing the ISOs and generators by region to facilitate easier coordination. Of course, additional responsibility could be given to the ISOs for setting standards but this would place them in the midst of a potential controversy. Since the idea is to keep the ISO independent, standard development may not be the best thing for an ISO to do. Even if these options don’t seem to be satisfactory, there appears to be yet another alternative on the table.

⁴² Hoecker, James J. Strategic Plan for Fiscal Years 2000 – 2005. Federal Energy Regulatory Commission. Sep. 2000.

⁴³ NERC to NAERO Transition: Frequently Asked Questions. 1 Jul. 2001 <<http://www.naero.org/faq.html>>.

AN ALTERNATIVE TO THE ERO

FERC has discussed the idea of using the GISB model (Gas Industry Standards Board) to create an “Electricity Industry Standards Board” or EISB that would standardize electric industry commercial practices nationwide.⁴⁴ The Gas Industry Standards Board was chartered in 1994 and is a nonprofit industry association whose mission is “to develop and promote standards to simplify and expand electronic communications, and to simplify and streamline business practices that will lead to a seamless marketplace for natural gas. These standards will assist the natural gas industry in improving customer service, enhancing the reliability of natural gas service and increasing the competitiveness and efficiency of natural gas markets.”⁴⁵

“The new players in the industry (marketers, merchant power) trust the GISB model more than the NERC/NAERO model because they feel that their interests have been better represented in GISB than in NERC. Meanwhile, the FERC trusts the GISB model, because, quite simply, it worked in the gas industry.”⁴⁶

Radford notes that there was no NERC equivalent in gas, so GISB stepped in and created a new way of integrating reliability concerns with commercial concerns in the gas industry. If FERC creates an EISB modeled after GISB, it would seem to simply pre-empt much of NERC/NAERO’s duties, leaving it with not much to do.⁴⁷ While this may be the case, the supporters of NAERO tend to counter the EISB idea by reinforcing FERC’s lack of authority to make such a move. The gas industry has met the concept with success largely because there

⁴⁴ Radford, Bruce W. “Re: NERC to NAERO.” E-mail to the author. 26 Jun. 2001.

⁴⁵ Concise Guide to GISB. Gas Industry Standards Board. 1997.

⁴⁶ Radford, Bruce W. “Re: NERC to NAERO.” E-mail to the author. 26 Jun. 2001.

⁴⁷ Radford, Bruce W. “Re: NERC to NAERO.” E-mail to the author. 26 Jun. 2001.

weren't alternatives. In the electric industry, NERC was already in place and was able to demonstrate their role in reliability assurance, hence justifying the transition to NAERO and no need for an EISB.

FEDERAL AUTHORITY VS. STATES RIGHTS

Without an EISB and with NAERO and the RTOs/ISOs coexisting, NAERO's role nationally is clear. But assuming NAERO does materialize, how would it interact with the states who, in the past, have been responsible for their utilities? The NAERO Frequently Asked Questions document addresses this concern by noting that because of the nature of the transmission grid, developments in one state can have dramatic effects on another part of the grid. Hence, no single state is in a position to oversee developments in geographically distant areas and NAERO's rules will apply to all bulk-power system facilities, without regard to their ownership or use. The states will still have a role to continue their responsibilities for siting and certificate of need determinations for new facilities, reliability of service on the local distribution systems, retail rates and service to individual customers, adequacy of transmission and generation facilities, and investigation of outages.

Moreover, the NERC consensus language includes a requirement that the new self-regulatory reliability organization consider recommendations of the states and state commissions. The consensus proposal also includes a state "savings clause" developed by representatives of industry organizations and the states, which defines the role and responsibility of the states with respect to reliability as compared to the role and responsibility of the new ERO. NERC strongly

supports this language.⁴⁸ So now, the proposed system takes in to account the states in a way that should not infringe on their authority. Furthermore, the Western Governors' Association, which represents 18 states including the populations of Texas and California, supports the idea of mandatory reliability standards and encourages the passage of federal legislation.⁴⁹ Ultimately it is the states that make the call to deregulate in the first place. Still, because the electric grid doesn't always follow political boundaries and because the public utility commissions can only enforce their rules for utilities within their state's border, a national organization will fill the gaps.

Of course, FERC will pick up where NAERO leaves off and serve as a "backstop" to NAERO on enforcement issues. Currently, FERC and NERC work together through a process defined in their Consultation and Communications Protocols. This protocol outlines a working relationship and a process for the two groups to meet informally to review information exchange status, policies, legislation, and any other matters of mutual interest.⁵⁰ A similar relationship will undoubtedly have to be defined for NAERO, especially because of FERC's proposed role in hearing appeals. But if FERC will be the final arbitrator of any decisions, is NAERO really necessary?

David Cook says NAERO is needed because of FERC's limited jurisdiction and authority, because of the international character of the North American grid, and because of the technical expertise required to develop and oversee compliance with bulk power system reliability

⁴⁸ NERC to NAERO Transition: Frequently Asked Questions. 1 Jul. 2001 <<http://www.naero.org/faq.html>>.

⁴⁹ "Legislation Needed to Ensure Reliability of the Electric Power System." Western Governors' Association. Jan. 2001 <http://www.westgov.org/wga/testim/electric_reliability.pdf>.

⁵⁰ Consultation and Communications Protocols Between the U.S. FERC and the NERC. Federal Energy Regulatory Commission. 15 May 2001.

standards. Legally, FERC does not have clear authority over reliability matters since legislation that would have given FERC's predecessor, the Federal Power Commission, authority over reliability matters was not passed when introduced in the 60s. Instead, the electric industry took on responsibility for assuring the reliability of the electric system with NERC formed to lead that effort.⁵¹ Now, the industry is hoping to assume the same responsibility in a different situation.

ENFORCEMENT ISSUES

Under the current proposal, NAERO would be the standard-setter and the police force. But, policing isn't always that easy. NERC says the federal legislation will clear up the question of who has power to enforce compliance with reliability standards but, according to Radford, the ultimate enforcement power may lie with consumers, who are free to file negligence lawsuits for damages.⁵² But rather than end up in this situation, NERC created the Compliance Enforcement Program. The CEP, which recently completed its second year of a multi-year phase-in, is supposed to do exactly what its name suggests. Implementation was designed to happen over four years, at which time all NERC/NAERO standards were to be measured for compliance and enforced with actual penalties and sanctions. Unfortunately, this schedule assumed the passage of federal legislation, which has not yet occurred. With the CEP entering its third year, compliance with NERC standards will be measured but "enforced" only by simulated enforcement actions.⁵³

⁵¹ Cook, David N. Testimony before the United States Senate Committee on Governmental Affairs. 28 Jun 2001.

⁵² Radford, Bruce W. "Re: NERC to NAERO." E-mail to the author. 26 Jun. 2001.

⁵³ Restructuring NERC: NERC 2000 Annual Report. 29 June 2001
<ftp://ftp.nerc.com/pub/sys/all_updl/docs/pubs/NERC2000report.pdf>.

On the other hand, some people believe that NERC/NAERO in terms of enforcement will do nothing. Jack Casazza, an industry expert who has served on the New York State Reliability Council and is familiar with the range of considerations involved, claims that NERC wants to make markets work but reliability must come before markets. The problem with NERC/NAERO is their enforcement procedure. Currently, NERC is checking if systems have simulated potential situations. In these simulations, however, they need to make assumptions that result in tests that don't mirror the real world. In fact, the real world is very difficult to model. In 1999, there were interruptions in the North East, South East, and elsewhere, and in every one, reliability studies were performed in advance and showed the systems to be reliable. They had not anticipated the problems that occurred. "They don't recognize the real world," Casazza says. "You can't ensure reliability from headquarters in Princeton."⁵⁴ While this opinion may appear extreme, Mr. Casazza is making an important point: the issue is complex and experienced engineers must be involved in the process at every level. People who have no experience with such a complicated system are probably not the best people to control it.

FUNDING

A remaining question is where will the funding for this organization come from? According to NERC, the regions will continue to fund core reliability activities. NAERO will charge third parties for products and services (e.g., maps, Generation Availability Data System) and will charge user fees where appropriate (e.g., Flow Impact Study Tool). They also intend to secure outside funding for some projects and to work with regulators to increase acceptance of need for inclusion of the costs of reliability in base rates.⁵⁵ NRECA, the National Rural Electric

⁵⁴ Casazza, Jack. Personal Interview. 27 Jun. 2001.

⁵⁵ NERC to NAERO Transition: Background. 25 Jun. 2001 <<http://www.nerc.com/naero/background.html>>.

Cooperative Association offered their comments on NAERO's finances. NRECA's voice in the matter is important because they represent 930 rural electric systems providing service to more than 34 million consumers in 46 states.⁵⁶ They suggest all voting members should pay dues. Because the dues are mandatory, they should be set in a matter that does not disadvantage small industry participants. NRECA also asks that all members pay a modest flat amount.⁵⁷ Of course, all of the money in the world isn't going to matter if Congress doesn't act.

LEGISLATION

NERC asks that reliability legislation allow for mandatory and enforceable reliability rules for all operators and users of the bulk power system in North America. These rules should be fairly developed and fairly applied by an independent, industry self-regulatory organization like NAERO. NAERO should have oversight within the U.S. by FERC and must respect the international character of the interconnected North American electric transmission system. In this arrangement, regional entities will have a significant role in implementing and enforcing compliance with these reliability standards, with delegated authority to develop appropriate regional reliability standards.⁵⁸ Clearly NERC is preaching a consistent message. NERC's message also matches the spirit of all of the pending federal legislation.

Senate Bill 172, the Electric Reliability Act, amends the Federal Power Act to establish mandatory reliability standards for the bulk power system. This bill would establish an ERO and

⁵⁶ Morrison, Jay. "Electric Reliability Comments of the National Rural Electric Cooperative Association." E-mail to the U.S. Department of Energy. 16 Jul. 2001

<http://www.nreca.org/leg_reg/modifieddoereliabilitycomments010400.html>.

⁵⁷ Kelly, Susan. "Comments of the NRECA on the Final Report of the Electric Reliability Panel." 10 Mar. 1998.

<http://www.nreca.org/leg_reg/retailwheel/03_98_nreca_naero310.html>.

⁵⁸ Cook, David N. Testimony before the United States Senate Committee on Governmental Affairs. 28 Jun 2001.

give FERC jurisdiction over it. It would also give the ERO disciplinary and enforcement powers and would not allow the ERO to preempt State action. Senate Bill 388/389 also amends the Federal Power Act to direct the FERC to create an ERO, which will adopt standards for reliable operation of the bulk power system. Finally, Senate Bill 597 would also amend the FPA to establish an ERO.⁵⁹ In the House, H.R. 312 amends the FPA to provide for the establishment of mandatory reliability standards to govern the operation of the bulk power system. It also grants the ERO disciplinary and enforcement powers and gives FERC approval and enforcement jurisdiction.⁶⁰ All of the bills use similar language when actually establishing the ERO so that any one of the bills will achieve the desired goal.

CONCLUSION

The reliability of the electric power system is something that is critical to the nation's health. Electricity can't be seen, is difficult to understand, and is taken for granted by the majority of its users. Ensuring those users that the lights will come on is a challenging task but has to be done. Engineers must be involved in the process because of the technical challenges associated with the system. And, although the laws of physics govern electricity, they do not govern people. While complete oversight and reliability of the grid and every electron on it may be a pipe dream, the market participants can be bound by a set of mutually developed guidelines that will provide a framework for reliability.

⁵⁹ Federal Restructuring Legislation. Energy Information Administration. 5 Jul. 2001
<http://www.eia.doe.gov/cneaf/electricity/page/restruct_bills/bill_summs.html>.

⁶⁰ Abel, Amy and Parker, Larry. Electricity: The Road Toward Restructuring. CRS Issue Brief. Congressional Research Service. 30 May 2001.

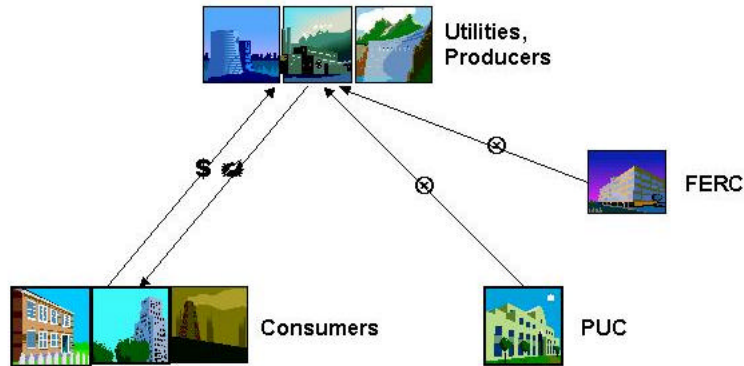
The solution to ensuring electric reliability in deregulated markets seems to be the formation of an electric reliability organization. Such an organization will need to have the support of the federal government and the approval of Congress. It has to be impartial, technically savvy, and motivated by one thing – maintaining reliable electricity. Although there are credible opponents to the concept of an ERO and forming an ERO will be a challenge, it is still the most suitable option for today's need. The industry has rallied behind the concept, Congress has recognized the need, and the public is waiting. The ERO is a major piece to the reliability puzzle and federal legislation should be enacted immediately.

APPENDIX A – GLOSSARY OF ACRONYMS

APPA	American Public Power Association
CEP	Compliance Enforcement Program
ECAR	East Central Area Reliability
EEI	Edison Electric Institute
EISB	Electric Industry Standards Board
ELCON	Electricity Consumers Resource Council
EPACT	Energy Policy Act (1992)
EPRI	Electric Power Research Institute
EPSA	Electric Power Supply Association
ERCOT	Electric Reliability Council of Texas
ERO	Electric Reliability Organization
EWG	Exempt Wholesale Generators
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
FRCC	Florida Reliability Coordinating Council
GISB	Gas Industry Standards Board
HR	House Resolution
ICAP	Installed Capacity
IEEE	Institute of Electrical and Electronics Engineers
ISO	Independent System Operator
MAAC	Mid-Atlantic Area Council
MAIN	Mid-America Interconnected Network
MAPP	Mid-Continent Area Power Pool
NAERO	North American Electric Reliability Organization
NERC	North American Electric Reliability Council
NPCC	Northeast Power Coordinating Council
NRECA	National Rural Electric Cooperative Association
OASIS	Open Access Same-time Information System
POST	Power Outage Study Team
PUC	Public Utility Commission
PUHCA	Public Utility Holding Company Act (1935)
PURPA	Public Utility Regulatory Policies Act (1978)
PX	Power Exchange
QF	Qualifying Facilities
RRO	Regional Reliability Organizations
RTO	Regional Transmission Organization
SERC	Southeastern Electric Reliability Council
SPP	Southwest Power Pool
SRRO	Self-Regulating Reliability Organization
T&D	Transmission and Distribution
WSCC	Western Systems Coordinating Council

APPENDIX B – THE INDUSTRY AND RESTRUCTURING

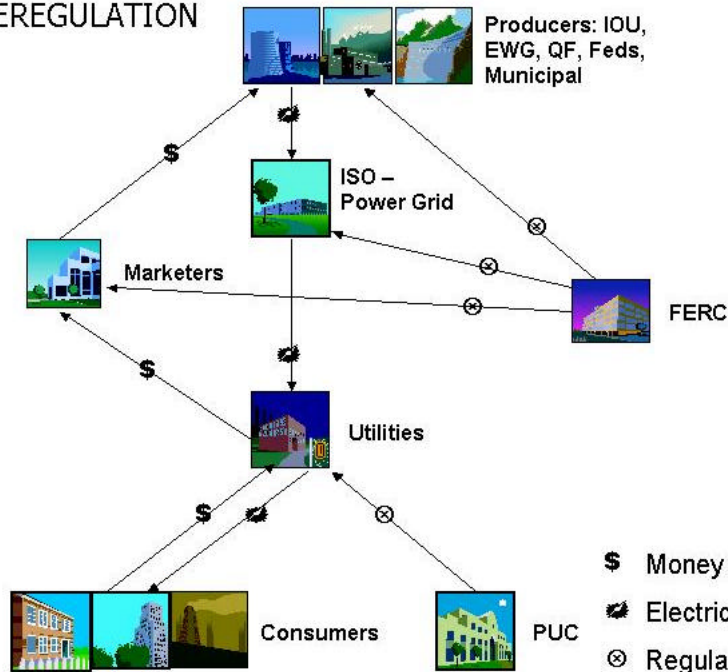
BEFORE DEREGULATION



- \$ Money
- ⚡ Electricity
- ⊗ Regulation

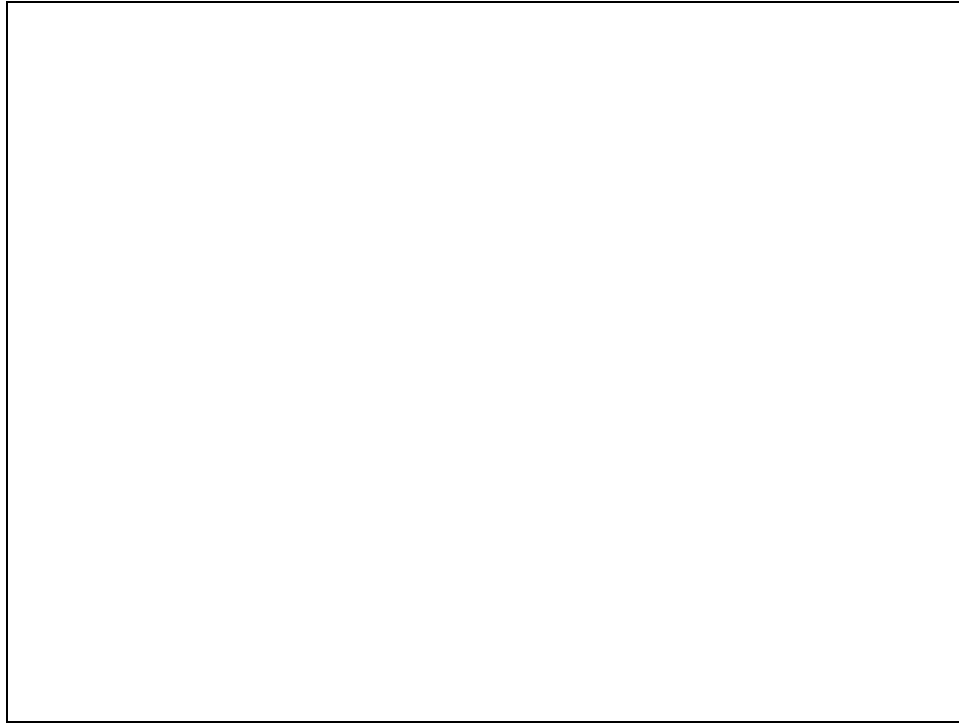
[How It Works: California Independent Systems Operator. 16 Jul. 2001.](http://www.caiso.com/docs/09003a6080/0b/cf09003a60800b.cf4f.pdf)
<http://www.caiso.com/docs/09003a6080/0b/cf09003a60800b.cf4f.pdf>.
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AFTER DEREGULATION



- \$ Money
- ⚡ Electricity
- ⊗ Regulation

APPENDIX C - REGIONAL RELIABILITY COUNCILS



Map by NERC - <http://www.nerc.com/regional/>

ERCOT – Electric Reliability Council of Texas
FRCC – Florida Reliability Coordinating Council
MAIN – Mid-America Interconnected Network
MAAC – Mid-Atlantic Area Council
MAPP – Mid-Continent Area Power Pool
NPCC – Northeast Power Coordinating Council
SERC – Southeastern Electric Reliability Council
SPP – Southwest Power Pool
WSCC – Western Systems Coordinating Council
ECAR – East Central Area Reliability

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