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A. Link: Plan's distortion of the electricity market blocks growth of new capacity, leading to blackouts during peak demand

Brennan, Economics Professor, Maryland, '02

[Timothy J., Professor of Policy Sciences and Economics, University of Maryland, Baltimore Country, and a senior fellow at Resources for the Future (RFF); Karen L. Palmer is a senior fellow at RFF; Salvador Martinez is a Ph.D. student in Economics at U. of Florida. *Alternating Currents: Electricity Markets and Public Policy*, Washington DC: Resources for the Future, page(s) 171-2]

Environmental regulation also can affect the extent of competition in—and thus the performance of—markets. In many regions of the country, such as the Southeast, generation markets are still fairly concentrated, with one or two generators dominating the market. In addition, in regions such as California, the Pacific Northwest, and the New York metropolitan area, available generating capacity is limited, creating the possibility of very high wholesale prices and even blackouts during periods of peak demand, particularly because retail prices generally do not reflect the true market price of generation at peak times. In both highly concentrated and capacity-constrained regions, entry by new generators is important to making generation markets more competitive. Entry will help to diminish the market power of existing generators in concentrated markets and help to increase the total amount of capacity available in the market during peak periods.
However, environmental regulations, including local siting restrictions and time-consuming approval processes, tend to raise the cost of entry and therefore may limit the number of potential competitors seeking to enter the market. (See the box, "Equity in Regulating Facility Construction," in Chapter 17.) To locate in some areas that are not in compliance with National Ambient Air Quality Standards, generators must purchase pollution offsets; these offsets—which can be very expensive—indicate that other formerly polluting sources have shut down or are reducing their pollution by an amount equal to the additional emissions expected from the new source. Siting requirements, which vary substantially from state to state, can increase the costs of building a new plant and lead to delays in bringing plants online. Uncertainty about the future course of environmental regulation—such as how and when the United States will decide to limit greenhouse gas emissions—can also have a similar investment-reducing effect that is independent of location within the country.

B. Internal Link: Small outages spread through the vulnerable Grid

Glauthier, President, Electricity Innovation Institute, '03

[T. J., President & CEO of the Electricity Innovation Institute (E2I), an affiliate of EPRI, the Electric Power Research Institute. With me today is Dejan Sobajic, Director of Grid Reliability and Power Markets at EPRI, Federal News Service, September 25, PREPARED TESTIMONY, BEFORE THE HOUSE COMMITTEE ON SCIENCE, SUBJECT - "LIGHTING UP THE BLACKOUT: TECHNOLOGY UPGRADES TO AMERICA'S ELECTRICAL SYSTEM" l/n]

I sincerely appreciate the opportunity to address this distinguished Committee on a subject about which we are all concerned. The electric power system represents the fundamental national infrastructure, upon which all other infrastructures depend for their daily operations. As we learned from the recent Northeast blackout, without electricity, municipal water pumps don't work, vehicular traffic grinds to a halt at intersections, subway trains stop between stations, and elevators stop between floors. The August 14th blackout also illustrated how vulnerable a regional power network can be to cascading outages caused by initially small--and still not fully understood--local problems.
In response to the Committee's request, my testimony today provides some of EPRI's and E2I's views on technology issues that require further attention to improve the effectiveness and reliability of the nation's interconnected power systems. This testimony will be supplemented with a matrix table as requested by the Committee.
Context for power reliability
Power system reliability is the product of many activities--planning, maintenance, operations, regulatory and reliability standards--all of which must be considered as the nation makes the transition over the longer term to a more efficient and effective power delivery system. While there are specific technologies that can be more widely applied to improve reliability both in the near- and intermediate-term, the inescapable reality is that there must be more than simply sufficient capacity in both generation and transmission in order for the system to operate reliably. The emergence of a competitive market in wholesale power transactions over the past decade has consumed much of the operating margin in transmission capacity that traditionally existed and helped to avert outages. Moreover, a lack of incentives for continuing investment in both new generating capacity and power delivery infrastructure has left the overall system much more vulnerable to the weakening effects of what would normally be low-level, isolated events and disturbances.

BLACKOUTS - 1NC SHELL

Blackouts cost the economy 30 Billion Dollars PER DAY. Just a few days of outage brings economic growth down to ZERO

Bryan '03

[Jay, *The Gazette* (Montreal, Quebec), August 19, SECTION: Business; Opinion on the Blackout; Pg. B1, HEADLINE: Power grids vital in information age: "Just a few days could theoretically take economic growth ... right down to zero" l/n]

This worsened the already-anemic state of a U.S. economy that had been hammered by a massive stock-market meltdown and a series of confidence-sapping corporate scandals. It hurt Canada, too, weakening our biggest market.

So now, just when there are signs of healthy growth in both countries, is the last time you'd want to see a large part of the continent's electric-power network collapse. We can be grateful that the immediate impacts look modest. David Rosenberg, chief North American economist with Merrill Lynch, estimates that the U.S. impact could amount to as much as $30 billion for each day of interrupted activity. That's roughly one percentage point of quarterly economic growth, which means that just a few days could theoretically take economic growth in the third quarter right down to zero.

But this is just the first step in his analysis. In reality, most activity was returning to something close to normal by yesterday. More important, Rosenberg says, any losses in August are likely to be recouped in September, much as economic activity rebounds to wipe out most losses after a severe winter storm.

But even if we do look back on the great blackout of '03 as a mere hiccup for the economy, there will be little reason for complacency.

As Royal Bank economist John Anania notes, the reliability of the power grid is absolutely indispensable in an information-age economy.

C. IMPACT: Economic collapse leads to huge wars worldwide, WMD use, and destruction of the biosphere

Bearden 2K

[T. E. Bearden, LTC, U.S. Army (Retired); CEO, CTEC Inc.; Director, Association of Distinguished American Scientists (ADAS); Fellow Emeritus, Alpha Foundation's Institute for Advanced Study (AIAS). ADAS Position Paper: Solution to the Energy Crisis, "The Unnecessary Energy Crisis: How to Solve It Quickly," June 12, 2000]

History bears out that desperate nations take desperate actions. Prior to the final economic collapse, the stress on nations will have increased the intensity and number of their conflicts, to the point where the arsenals of weapons of mass destruction (WMD) now possessed by some 25 nations, are almost certain to be released. As an example, suppose a starving North Korea {2} launches nuclear weapons upon Japan and South Korea, including U.S. forces there, in a spasmodic suicidal response. Or suppose a desperate China — whose long range nuclear missiles can reach the United States — attacks Taiwan. In addition to immediate responses, the mutual treaties involved in such scenarios will quickly draw other nations into the conflict, escalating it significantly.

Strategic nuclear studies have shown for decades that, under such extreme stress conditions, once a few nukes are launched, adversaries and potential adversaries are then compelled to launch on perception of preparations by one's adversary. The real legacy of the MAD concept is this side of the MAD coin that is almost never discussed. Without effective defense, the only chance a nation has to survive at all, is to launch immediate full-bore pre-emptive strikes and try to take out its perceived foes as rapidly and massively as possible.

As the studies showed, rapid escalation to full WMD exchange occurs, with a great percent of the WMD arsenals being unleashed. The resulting great Armageddon will destroy civilization as we know it, and perhaps most of the biosphere, at least for many decades.

FYI: Strategy Guide

This disadvantage argues that certain types of electrical power generation will make grid management much more difficult. This will lead to more blackouts and other disruptions. The economy will suffer significantly. This huge economic collapse will inflame political tensions and eventually lead to a massive war involving the entire world.

When you flip the switch on the wall, you expect the light to shine. Why? Because Americans expect their supply of electrical energy to be reliable. The typical situation is this: large power plants in a distant location generate electricity. That electrical power is sent along a network of wires to customers, such as factories, farms, businesses, and households. The network of wires is known as the electrical grid or simply "the grid."

Most of us have also experienced a blackout. Occasionally bad weather and other sudden events will snap power lines in a specific area and prevent electricity from reaching consumers in a particular location. Enough electricity might be available but cannot reach those who wish to use it. Generally such disruptions are repaired quickly and life returns to normal.

Electricity is generated and electricity is also distributed. The physics of electricity makes storage of large amount of electricity very difficult and costly. And electricity travels at the speed of light within the distribution grid. So a customer seeking to flip on a light or a television with electricity flowing from a wall socket must be supplied by an electrical generator operating at that very moment. If the customer needs 10 Watts to power a toaster, then 10 Watts must be available at that moment. The total demand for electricity at any specific moment is known as the "load." The generators of electricity must supply enough electrical power match that "load." If the demand for electricity exceeds the supply along a particular section of the grid, then problems occur. Some customers may experience a decrease in power. Some customers may experience a complete lack of power. Or the entire grid might shut down. Since grids are connected to other grids, operators can supply some extra energy to a connected grid that needs it. Generally those connections allow operators to maintain the proper and efficient balance between electricity supply and electricity demand across a large area. However, those same connections can also allow grid disruptions to spread from one area to connected areas. Entire regions can be affected in the worst scenarios as the problems ripples through connected grids.

The production and supply of megawatts of power is a complex endeavor. Management of the grid requires a large team of trained technicians, engineers, and monitors. Customers do not warn grid managers immediately prior to turning on the television. So managers must anticipate times of rising demand and co-ordinate with generators to ensure that enough electricity is generated to meet the aggregate demand of the customers. Providing enough electricity to customers when they need it without disruptions and fluctuations is the hallmark of a reliable electrical power system.

The United States as a society has spent an enormous amount of time and money to build a huge energy grid with a strong record reliability. Many other countries are not so lucky. Millions of people live in areas that lack reliable power. Their grids are not reliable and their lives are affected significantly. These blackouts and brownouts significantly affect electronics, manufacturing, and many other activities crucial to a modern society and a modern economy. The Republic of South Africa, for example, is currently experiencing a huge electricity crisis and the corresponding economic distributions.

However, some areas of the United States are already facing the prospect of severe electricity crises. The grid in many areas is already under stress as demand for electricity grows but new generation capacity has failed to keep pace with rising demand. The appetite of people and business for most electricity grows but new generation (especially new coal and nuclear plants) are blocked. Some areas – such as California and the Northeast – have recently experienced severe grid failures and suffered severe economic damage due to blackouts, brownouts, and similar reliability problems. Reliability problems that are frequent or widespread can cause significant economic problems, especially in those sectors dependent upon sensitive electronic equipment.

Many types of alternative energy – wind, solar, tidal, etc. – provide power inconsistently throughout the seasons and through the day. These fluctuations create great grid management problems for grid operators. Affirmative cases that create more alternative energy generation will increase the complexity of grid management and thus make blackouts (and brownouts and related problems) more likely. Also most new precise IT equipment requires a very high degree of reliability. Even tiny fluctuations in the strength of the power supplied that escape the notice of most people can cause a sophisticated computer array or a computer-control assembly line to falter and stay down for days or weeks. Generation using alternative energy makes grid management more difficult and therefore increases the risk of widespread outages (such as blackouts) as well as smaller chronic disruptions. A large increase in either large-scale outages or chronic disruptions would cause widespread damage to the U.S. economy. The negatives can argue that only reliable energy generation facilities (such as coal-fired plants) will help us to avoid the looming reliability problems.

Creative affirmatives might be able to run a Blackouts Advantage. Clearly nuclear power can make strong claims to providing reliable electricity. Affirmatives that advocate a shift to renewable energy on a distributed basis could also claim a blackouts advantage. Distributed generation (DG) is less likely to generate large-scale grid failure even if it is more difficult to manage. And DG also allows areas to recover more quickly from blackouts.

FYI: List of Blackouts

List of Major Blackouts during from September 2002 – September 2003

Katz '04

[Alan, Senior Product Manager at MGE UPS Systems in California, *Electrical Consumption and Maintenance*, June 1, "Maintaining Facility Power in the Age of the Blackout," l/n]

Going Global: Recent Blackouts

Sept. 23, 2002: A massive power failure disrupts central Chile. The official reason is said to be "faulty programming" and a "technical failure" at a power station.

Nov. 24, 2002: Buenos Aires and La Plata, Argentina, are hit by a huge power failure.

Jan. 31, 2003: An unusual power failure hits Cambridge, Ontario, Canada.

April 29, 2003: A power failure hits the airport in Melbourne, Australia, disrupting operations for 90 minutes.

Aug. 6, 2003: Buenos Aires is hit again by another sudden blackout.

Aug. 14, 2003: The first major blackout occurs in the northeastern United States and Canada, affecting some 50 million people. Blame centers on a single power generation plant owned by Ohio's FirstEnergy Corp.

Aug. 23, 2003: Finland's capital of Helsinki and its suburbs, including the international airport at Vantaa, are blacked out, affecting more than a half million people in a country known for its first-rate electrical grid.

Aug. 28, 2003: At the height of London's evening rush hour, a massive power outage strikes the city and southeast England. The blackout is blamed on a "fault" in the national electrical grid. The event that Britain's Network Rail calls "unprecedented" stops 18,000 trains, including 60% of the London Underground.

Sept. 1, 2003: Malaysia's capital of Kuala Lumpur and five Malaysian states are struck by a massive blackout. Workers in the Petronas Towers, the world's tallest buildings, are trapped in elevators. With signal lights out, traffic in downtown Kuala Lumpur grinds to a virtual halt. What makes the event all the more perplexing is that blackouts are very rare in the country.

Sept. 2, 2003: Cancun, Mexico, plunges into a blackout. Power is out for six hours, affecting three million people.

Sept. 23, 2003: Eastern Denmark and southern Sweden, including the cities of Copenhagen and Malmo, lose power in what is described as a "very unusual" blackout that affects four million people.

Sept. 28, 2003: A massive power failure strikes Italy, affecting 57 million people. It's later blamed on a tree that hit a high-voltage transmission line.

FYI: Types of "Reliability Events"

IEEE '02

["Electric Power Reliability Organization," position statement issued by the IEEE-USA Board of Directors, Nov. 13, IEEE = Institute of Electrical and Electronic Engineers, http://www.ieeeusa.org/forum/POSITIONS/reliability.html d/l: 9-4-08]

Reliability events can occur at several levels. One level is the distribution level. Distribution systems are (unless otherwise specified) generally radial in nature. The radial nature of most distribution systems simplifies their operation by avoiding loop flows and it also simplifies the protection system and the voltage control along the distribution feeders. Distribution systems are local in nature and in design, consequently, distribution outages are local events.

The second level at which reliability events can occur is the transmission level. Transmission level events are much more rare than distribution system events. However, when they occur they tend to be far more pervasive than distribution system events, both in duration and in geographic extent. Major transmission-level events can create regional blackouts that have significant cost consequences. More insidious, however, is that recovery from such events can be a time consuming, expensive and tedious process fraught with pitfalls and difficulties. It is generally accepted that the power system must be operated in such a way that uncontrolled transmission outages leading to cascading power outages should not be permitted to happen. To assure this level of reliability, the system is generally operated based on an n-1 criterion: the failure of any one component in the transmission or supply systems does not lead to transmission voltages outside of limits nor overloading of equipment.

A key concept of electrical system reliability is that the transmission system itself is designed and operated based on the amount and location of generation connected to the system. The transmission system must not only assure the ability to supply the loads from the generator in operation at any time, but must also be able to withstand transients.

Transmission systems must be optimized in "three dimensions" in order to achieve both reliability and minimum costs for electric power.

They should be optimized "geographically," that is the transmission system must meet the needs of all who are served by the synchronous network, not just the needs of any one system, any one area, or any one region.

They must also be optimized "functionally," that is the transmission system must meet both generation requirements and the requirements of the distribution systems that they supply.

And lastly, they must be optimized "chronologically." Transmission systems must be developed to meet needs over a significant period of time since they are expensive to change once constructed. They must also evolve in a rational manner, without leading to undue problems or bottlenecks during intermediate stages of development.

A third level at which reliability events can occur is at the generation, or supply, level. A supply reliability event occurs when there is insufficiency of generation or the inability to get operational generation to its intended load. When this is the case there is simply no alternative but the reduction of load by whatever means necessary; otherwise the entire system fails. If the proper incentives are in place (such as interruptible contracts or sufficiently responsive pricing mechanisms), load reduction can still be voluntary (although some would question the long-term and social impact of reliance on load reduction, particularly load reduction attained by aggressive pricing, as a means of attaining energy balance). When voluntary means are not available, the only other alternative is the use of rotating blackouts. Another example of this type of supply level problem is the ongoing crisis in Brazil as a result of severe drought and the strong reliance of Brazil on hydropower.

A fourth, and new, manner in which a reliability event can occur is what one could term a "market" event. The crisis in California during 2000 and 2001, which culminated in a series of such events, is an example. This occurs when not enough resources are offered into the market, or when resources are offered into the market at inflated prices as a result of market power conditions that may be in effect. The experience of the past few years in this regard has clearly indicated that there is a strong connection between price spikes and reliability. Generally, in a market system, a price spike is a precursor to a reliability event. Only when supplies are tight are prices likely to spike. Generally, if supplies get any tighter, pricing mechanisms and incentives are insufficient to meet the load and a reliability event ensues.

Within one of the three large regional interconnections, generation and transmission are coupled. A generation event can almost always be viewed as a transmission event. Within one of these interconnections problems in one location can "ripple" throughout the grid, sometimes being damped and sometimes creating cascading problems. This can be true of financial measures of performance just as with physical measures. For example, high spot market prices in California usually mean high spot market prices throughout the West, because power is traded throughout the interconnection, not just within a single regulatory jurisdiction.

Market events are not distinct and separate from generation and transmission events. In the end, a market event leading to a price spike has immediate consequences on transmission. When the system operates in a traditional environment, operators will try to purchase and import power from cheaper regions up until the point where physical constraints prevent it. When operating according to a market structure, traders and others having a short position in the high priced region will make every effort to purchase cheaper power elsewhere and secure the necessary transmission required delivering it to the high priced region. Limitations in the transmission grid often make this impossible, leading to a direct connection between market events and reliability events.

Brink: Electrical Grid

Electrical Grid is under stress and on the brink now

Trivella '08

[Anthony J., Executive Vice President at The Hartford Steam Boiler Inspection and Insurance Company, One of the world's leading equipment breakdown insurers. "Mitigating Equipment Breakdown Risks," June 4, 2008, *Industry Week*, http://www.industryweek.com/ReadArticle.aspx?ArticleID=16446&SectionID=2 download date: 6-20-08]

What's the most vulnerable part of many businesses? For most, it's the equipment that keeps them up and running. But what if that equipment or the infrastructure that supports it, such as the power grid or a building's electrical system, breaks down? Commerce falters or stops, profits disappear, customers look elsewhere for products and services.

The risks faced by business and industry are exacerbated by four converging trends: Aging infrastructure; demand for equipment in a global economy; rising energy demands and costs, and proliferation of technology. Fortunately, there are ways to mitigate and manage risk. What's needed are innovative strategies focused on engineering, risk assessment, loss prevention and contingency planning.

Aging Infrastructure Meets the Data Explosion

The U.S. infrastructure, including the power grid and the equipment that distributes electricity inside commercial buildings, is being strained by aging equipment and the proliferation of power-hungry new technology. Much of the transmission grid system was developed more than a half century ago. The electrical systems in many buildings were not designed to carry the loads that are necessary today.

Consider these facts:

* U.S. electricity consumption at peak demand times is growing at twice the pace that committed power generation capacity is being added.
* A recent North American Electric Reliability Corporation (NERC) survey of utility industry professionals ranked aging infrastructure and limited new construction as the number one challenge to electric reliability -- both in likelihood of occurrence and potential severity.
* The electric transmission system is increasingly operating close to its capacity margin and many areas of the grid are regularly under stress.
* Construction of new transmission facilities is still slow and continues to face obstacles.
* The average age of transformers used within the utility industry is over 30 years old and many units are nearing the end of their expected life.
* Electrical systems within buildings are often overlooked and under-maintained. Too many building owners don't realize that electrical equipment requires preventive maintenance.
* Estimates on the annual costs to industry from power surges and other related anomalies have ranged from $30 billion to $200 billion.
* Despite reliance on sensitive digital technology, equipment owners too often neglect to install adequate electrical surge protection, placing equipment and business activity at risk.

These trends increase the risk for more frequent and severe blackouts and brownouts, electrical system breakdowns, equipment damage, business interruption and structure fires. In fact, the National Fire Protection Association (NFPA) reports electrical distribution failures each year are responsible for about 9 percent of fires in commercial buildings.

The loss of power or poor power quality presents other exposures. In our information-based society with its explosive data growth, any power interruption can result in a commercial disaster. Data can be lost due to equipment breakdown and it can be expensive, and sometimes impossible, to restore the information due to rapid changes in technology.

Uniqueness: Not Reliable in SQ. More failures coming

Grid not reliable. More failures coming

Katz '04

[Alan, Senior Product Manager at MGE UPS Systems in California, *Electrical Consumption and Maintenance*, June 1, "Maintaining Facility Power in the Age of the Blackout," l/n]

Three years ago California endured a summer of rolling blackouts that cost businesses millions of dollars in lost production and raised concerns about the rest of the nation's power grid. Despite warnings about the poor condition of the power grid from those in the highest offices in the nation, little was said about how or when the problem would be remedied.

In a bid to urge new standards for the reliability of the electric power system, former Energy Secretary Bill Richardson said, "In my view, we're the world's greatest superpower, but we have a Third World electricity grid. We have antiquated transmission lines. We have an overloaded system that has not had any new investments. And we don't have mandatory reliability standards on utilities."

Even the current Secretary of Energy, Spencer Abraham, has recognized that it likely will be a bumpy ride, stating that "Our nation's transmission system over the next decade will fall short of the reliability standards our economy requires and will result in additional bottlenecks and higher costs to consumers. It is essential that we begin immediately to implement the improvements that are needed to ensure continued growth and prosperity."

Uniqueness: Blackouts coming in SQ

___. Massive blackouts are coming in the Status Quo. The longer we wait to establish a new system, the greater becomes of the risk and magnitude of grid failures

Boston Globe '03

[by Michael Kranish, staff writer, "Blackout Early Alert/Advisory; GroupWarned of Potential Outage," Aug. 15, 2003, l/n]

The organization responsible for preventing massive blackouts in the United States has been warning for months that the nation's system of voluntary compliance with electricity standards is inadequate and could result in just the kind of widescale power outage that occurred yesterday.

Indeed, in a document written just days ago, the North American Electric Reliability Council said there has been "a marked increase in the number and seriousness of violations" of guidelines governing the nation's power companies and that "the very stability of the electric system upon which our economy and our society depends" has "no effective recourse today to correct such behavior." The document goes on to warn that "the longer it takes to establish this new system, the greater becomes the risk and magnitude of grid failures."

The organization has been pushing legislation in Congress to have the federal government require more cooperation between power companies. Currently, companies are asked to share power in ways that ensure that when a failure occurs in one place it can be covered by another. While stronger legislation has passed the House and Senate, the bills have not yet been reconciled and made into law by the full Congress. And, while the legislation calls on power companies to find new ways to improve reliability, it is not clear whether it would require industry-wide mandatory standards.

Last night, a spokesman for the Reliability Council said she had no way of knowing whether yesterday's power failure in the Northeast was caused by the problems cited in the council's report. But speaking generally, the spokeswoman, Ellen Vancko, said, "Problems could occur because the grid is interconnected and everybody's actions affect the operations of others. If everybody doesn't follow the same rules, the potential for broad disruptions are there."

But given the organization's dire warnings and the blackout that occurred yesterday, it seems certain that much more attention will now be paid to the allegation that many violations have occurred in the past.

At the heart of the problem is that while the interconnected power system relies on cooperation among the electric companies, the federal government does not require such cooperation in all cases. The North American Electric Reliability Council is a nonprofit voluntary organization, formed after the infamous 1965 blackout in New York City, that is responsible for assuring similar power outages do not occur. But the council has been concerned in recent years that its reliance on voluntary cooperation is no longer producing the kind of compliance necessary to avoid blackouts.

In theory, the electric companies are supposed to follow voluntary measures in which they work together to ensure that the power supply is shared and uninterrupted. But in testimony before Congress earlier this year, the Reliability Council's president, Michael R. Gent, said that the government's rules "are not now enforceable."

Part of the debate over the bill centers on the question of whether the deregulation of the electric industry has led to price gouging and blackouts. After blackouts in California several years ago, some critics said that the government should impose stronger regulation.

Bill Brier, a spokesman for the industry's Edison Electric Institute, said his organization still favors deregulation but does support legislation that impose mandatory rules on power companies to fulfill their obligations on the energy grid.

Representative Edward Markey, a Malden Democrat who sits on the committee that held hearings on the legislation, said in a statement last night that the blackouts would cause a reexamination of the nation's oversight of power companies.

Uniqueness: Blackouts coming in SQ

___. Even Department of Energy reports warn that multiple factors are over-stressing the Transmission Grid. The result will be Grid failure and Blackouts in the Status Quo

Irwin '03

[Patricia, *Engineering News-Record*, August 25, 2003, SECTION: NEWS; TRANSMISSION RESEARCH; Vol. 251, No. 8; Pg. 15, HEADLINE: DOE Report Identified Grid Needs, Predicted Blackouts, l/n]

Hindsight may be 20/20, but what about foresight? In May 2002, the U.S. Dept. of Energy presented a 93-page report, the National Transmission Grid Study, that warned of the need for investment in the national grid or face potential breakdowns and service outages.

"This report makes clear that our nation's transmission system over the next decade will fall short of the reliability standards our economy requires and will result in additional bottlenecks and higher costs to consumers," said DOE Secretary Spencer Abraham in the report's cover letter.

DOE found benefits in an open power market, noting that each year, wholesale electric markets save consumers $ 13 billion. In contrast, transmission bottlenecks cost consumers a few hundred million dollars. So, from a cost-to-consumer viewpoint, transmission inefficiencies may appear to be a small concern. But DOE clearly states that there are significant transmission problems that must be addressed.

"There is growing evidence that the U.S. transmission system is in urgent need of modernization," said the report. "The system has become congested because growth in electricity demand and investment in new generation facilities have not been matched by investment in new transmission facilities. Transmission problems have been compounded by the incomplete transition to fair and efficient competitive wholesale electricity markets. Because the existing transmission system was not designed to meet present demand, daily transmission constraints or 'bottlenecks' increase electricity costs to consumers and increase the risk of blackouts."

DOE noted that the transmission system now is stressed as never before. It said this is largely from rising demand, the lack of investment in transmission systems, power transfers between areas that are larger than anticipated and going in unexpected directions, and the incomplete transition to a fully competitive market.

Uniqueness: Blackout risk high (deregulation)

Electricity deregulation has over-loaded the grid. Risk of a huge, widespread blackout is increasing

Kuttner '03

[Robert, co-founder and co-editor of The American Prospect, syndicated columnist and author, former John F. Kennedy Fellow at Harvard, former Woodrow Wilson Fellow at Cal-Berkeley, "Electrical Storm," The American Prospect Online, August 21]

Everyone seems obsessed about which weak link in the power chain caused last week's spectacular blackout. But that exercise is a little like wondering where it was a nail or a piece of glass that finally caused a bald tire to blow. In this case, the bald tire is the electrical grid. And the grid is overstressed because of the logic of electricity deregulation.

Until the mid-1990s, local public utilities generated, transported, and sold power. State public utilities commissions shared responsibility for planning adequate capacity and for making sure that utilities invested in maintaining transmission lines. As regulated monopolies, the utilities were guaranteed a fair rate of return.

Most economists thought that electric companies had to be organized and regulated as "natural monopolies," for several reasons: Power could not be efficiently stored. Electricity is a vital service. There needs to be spare capacity for periods of peak demand. And it makes no sense economically to string two parallel sets of wires, so the consumer could not be sovereign. In the 1970s, however, a new wave of economic thinking held that electric power could be treated like an ordinary commodity after all. Local utilities would get out of the business of generating electricity. They would buy their power from the cheapest producer, and the market in wholesale electricity would be like any other market. Local utilities, however, would still be regulated in terms of rates they could charge customers and in terms of the system's reliability.

But, as the Enron scandal and the great blackout of 2003 demonstrated, the theory had some big glitches. The new unregulated generating companies often took advantage of their power to manipulate prices. And with electricity being bought and sold over long distances, the grid (which was designed for a local regulated industry) was not up to the load. Nor was anyone ultimately responsible for upgrading it.

In theory, it's efficient to trade wholesale electricity. But in practice, it costs a fortune to upgrade transmission lines in order to transmit all that power. It's not at all clear that the benefits outweigh the new costs. It's also evident that deregulation has dramatically increased the risk of catastrophic failure. Earlier blackouts were usually confined to smaller areas because long-distance transmission was a rarity.

Further, the obscure organization responsible for coordinating the whole show, the North American Electric Reliability Council, is a voluntary industry affair. Its own executives and engineers say that it lacks the authority to effectively govern the grid.

Uniqueness: Grid still Vulnerable

Feds have NOT acted to improve reliability (– and renewable DG solves)

U.S. Newswire '04

[SECTION: National Desk, Environment and Energy reporters, "Year after Largest Blackout in US History, Bush Administration & Congress Have Done Nothing to Prevent Future Blackouts Says New Radio Ad," August 11, Lexis-Nexis]

One year after the largest blackout in U.S. history, the Bush Administration and Congress have done nothing to prevent future electricity blackouts, according to new radio ads paid for by a coalition of 22 national environmental groups.

The Northeast-Midwest blackout on Aug. 14, 2003, left over 28 million people in Michigan, New York, Ohio and other states without electricity for up to four days. Nonetheless, the Administration and Congress have done nothing to increase the reliability of the electricity grid, reduce demand via energy efficiency, or spur renewable energy. The coalition of 22 national environmental organizations, Save Our Environment (see note), will air ads pointing out this failure on radio stations in Akron, Canton, and Toledo, Ohio and in Kalamazoo and Lansing, Michigan. All of these cities lost power during the blackout. The ad, titled "In the Dark," was produced by Haddow Communications. It will air in the five media markets 15 to 25 times a day from Wednesday, August 11 through Saturday, August 14, the first anniversary of the blackout. The ad copy and list of stations where the ad will air is attached; an MP3 file of the ad audio is available by contacting Dan Weiss at 202-478-6307 or dweiss@mrss.com.

"The Bush Administration and Congressional leaders promote policies that could leave us in the dark again," said Anna Aurilio, Legislative Director of U.S. PIRG, which is a member of Save Our Environment. "They are pushing an energy bill that leaves us at risk for future blackouts, while they squander taxpayer dollars on dirty fuels such as coal, oil, and nuclear power."

"These ads are a wake up call for the Bush Administration and Congress. They must act now to make electricity more reliable, renewable, and efficient," said Debbie Boger, Deputy Legislative Director of Sierra Club, another member of Save Our Environment. "Increased reliability, energy efficiency, and more renewable power will reduce the risk of future blackouts, create jobs, and reduce pollution."

A recent analysis by Synapse Energy Economics found that increasing energy efficiency and renewable energy, and distributed generation would save an estimated $36 billion annually by 2025. At the same time, it would reduce the harmful public health and environmental effects of electricity generation. The report is available at http://www.newenergyfuture.com.

Since the Aug. 14, 2003, blackout, the Bush and Administration and Congressional leaders have held reliability standards hostage to passage of the energy bill, H.R. 6, which contains $31 billion in taxpayer handouts to industry. It would encourage more oil drilling, coal consumption, and nuclear power. More than 100 newspapers have editorialized in opposition to H.R. 6, including The Akron Beacon Journal, Dayton Daily New, Detroit News, Kalamazoo Gazette, Toledo Blade, and The Wall Street Journal. The House of Representatives passed the bill twice, but the Senate blocked it twice. Despite the fact that it leaves consumers more vulnerable to blackouts, proponents of H.R. 6 may use the anniversary of the blackout as an excuse to revive it.

NOTE: Save Our Environment is a coalition of 22 major national environmental organizations including the Sierra Club, U.S. PIRG, and the Natural Resources Defense Council.

Uniqueness: Grid Still Vulnerable

Utilities are financially weak – they don't have the money to make the needed investments in Grid reliability

Sillin '03

[John O., Administrative Officer of Energy Strategists Consultancy Limited, *PUBLIC UTILITIES FORTNIGHTLY*, Sept. 15, SECTION: THE BLACKOUT OF 2003; Pg. 30, HEADLINE: Why We Fell Into the Heart Of Darkness, l/n]

Unfortunately, not only did essential electric infrastructure investments not get made, but significant elements of the electricity sector are in a state of near bankruptcy as one unregulated investment after another failed.

. Natural Gas Merchant Power Plant Investments. Upward of $ 100 billion dollars was invested in merchant power plants since passage of the 1992 Energy Policy Act. Nearly all of these plants are fueled with natural gas (because they are cheap to build). But as a result of the steady increase in natural gas prices over the last four years, nearly all are uneconomic. Power plants fueled with natural gas will simply not be dispatched when natural gas costs $ 4.50 per MMBtu and up. Accompanied by a reduction in wholesale electricity prices as the national economy slowed, merchant power plant profit margins collapsed. Those companies that made merchant power plants a key component of their business strategy have seen their share price collapse.

. Energy Trading. Energy trading, and in particular electricity trading, combined with misleading if not falsified financial statements, were at the heart of the collapse of this business. Again, literally billions of dollars have been lost by energy trading organizations and their financial backers on Wall Street. Investors failed to realize there was much less business here than could sustain the hype surrounding it. Electricity wholesale contractual agreements almost always exist between companies or organizations in close proximity to one another. This is because the greater the number of electric systems bulk power has to move across, the greater the friction in moving it, and consequent transmission losses. Unless systems are strongly interconnected, bulk power transfers become uneconomic, if not physically impossible.

. International Acquisitions. Beginning in the early and mid-1990s, acquisition of power plants and other utility assets in the international market place became a preferred investment strategy. While international investments were worldwide, they were concentrated in Latin America, the United Kingdom, and Southeast Asia. Acquisitions included buying existing generating assets, building new plants, and buying entire distribution systems. It is the rare utility that has made any money in international utility investments. Most, like TXU in the United Kingdom or AES in Latin America, lost hundreds of millions, if not billions of dollars.

As a result of these and other investment misadventures (*e.g.,* diversification into telecommunications and real estate) the electric power sector has been, to put it mildly, financially traumatized.

The Dow Jones Electric Utilities Index reached a high of just over 170 in December 2001 and stands at 103 as of this writing.

This and the broader Dow Jones Utilities Index declined after the end of the tech-stock bubble in March 2000, and the terrorist attacks on 9/11. In fact, electricity stocks were thought to be a safe financial haven. Diversification failures changed this assumption. Not only has the electric industry walked away from delivering economic and reliable electric service as its mission, but much of the industry no longer has the financial capacity to make investments directed at this mission.

Grid infrastructure neglected

Sillin '03

[John O., Administrative Officer of Energy Strategists Consultancy Limited, *PUBLIC UTILITIES FORTNIGHTLY*, Sept. 15, SECTION: THE BLACKOUT OF 2003; Pg. 30, HEADLINE: Why We Fell Into the Heart Of Darkness, l/n]

The Act gave utilities and independent power producers the ability to invest ingeneration wherever and whenever they wanted. But it did not resolve the issue of who would pay for it (remember retail rates are set by state regulators), and did not address the need to upgrade the power-carrying capacity of the electrical grid. The result was that utilities and independent power producers went in search of profits outside historical lines of business, and left the electrical grid to a condition that was, in effect, benign neglect. Electric infrastructure investments as a percent of revenue dollars fell to record lows.

Uniqueness: Blackouts Coming in SQ

Coming wave of bankruptcies among power companies will slash Grid reliability

Sillin '03

[John O., Administrative Officer of Energy Strategists Consultancy Limited, *PUBLIC UTILITIES FORTNIGHTLY*, Sept. 15, SECTION: THE BLACKOUT OF 2003; Pg. 30, HEADLINE: Why We Fell Into the Heart Of Darkness, l/n]

As investments in the electricity infrastructure declined, so did its reliability. Up until the recent recession, generating capacity reserve margins declined to dangerously low levels of 15 percent and less.

It has since recovered to just over 20 percent, but only through the addition of natural gas-fired power plants that are now uneconomic and operated by organizations that are bankrupt or struggling for financial survival. How reliable can this capacity be? Pepco and Northeast Utilities are among utilities dependent on near-bankrupt organizations for significant portions of electric supply, and are at risk of seeing these supplies cutoff.

Grid is highly vulnerable since demand overwhelms infrastructure investment

Natural Gas Week '03

[Aug. 16, HEADLINE: Blackout Shines Spotlight on US Power Grid Inadequacies, l/n]

Schaal feels this was a terrible mistake since the impasse between Congress and the FERC over new power transmission rules has left in place a regulatory regime that "is not structured to allow much of the needed investment to bolster the transmission system."

As such, investment in new power transmission has not kept pace with the large increase in power generation that occurred over last decade in the US or with increasing electricity demand.

"From 1988 to 1998 electricity demand in the US grew about 35% while transmission capacity expansion was about half that at about 17%," said Massoud Amin, an electrical engineering professor at the University of Minnesota that has worked with the Electric Power Research Institute (EPRI) on infrastructure issues. EPRI is an electric industry technology research group funded by the utilities.

Amin said that transmission investment has fallen from $5.5 billion in 1997 to about $2.6 billion today. From 1999 to 2009 he said that transmission capacity is expected to grow only 4% while electricity demand will increase by some 20%, placing enormous stress and strain on the system.

Uniqueness: Blackouts Coming in SQ

Physical infrastructure for Transmission is over-burdened and reliability will suffer unless reinforced

IEEE '02

["Electric Power Reliability Organization," position statement issued by the IEEE-USA Board of Directors, Nov. 13, IEEE = Institute of Electrical and Electronic Engineers, http://www.ieeeusa.org/forum/POSITIONS/reliability.html d/l: September4, 2004]

Compounding the challenge of assuring security and reliability is the significant misunderstanding in government and policy circles as to how electric power systems work. There is additional misunderstanding regarding the design basis of the existing transmission system and its capabilities. Today's power systems were designed piecemeal over the last hundred years to provide the individual needs of hundreds of vertically integrated utilities. Many of these utilities were interconnected over time to improve reliability and provide for a limited amount of economy sales between utilities. FERC Order 888 changed the purpose of transmission systems from one of local supply to that of common carrier, but the physical transmission system itself has not changed. The action of legislatures or regulators does not change the laws of physics: Transmission systems have only limited capabilities to perform beyond their design parameters. This statement is true for both the added redundancy needed to address security and reliability in face of deliberate acts of sabotage and to provide added economies in a restructured and deregulated wholesale market. If the transmission system is to operate as a common carrier, it needs to be assessed from that perspective and reinforced and expanded to accomplish this new function successfully. Until this assessment, and subsequent physical upgrades have occurred, attempts to use the existing transmission system as a common carrier may create reliability problems.

Link: Environmental Regulations

Environmental regulations limit new generation, leads to blackouts

Brennan, Economics Professor, Maryland, '02

[Timothy J., Professor of Policy Sciences and Economics, University of Maryland, Baltimore Country, and a senior fellow at Resources for the Future (RFF); Karen L. Palmer is a senior fellow at RFF; Salvador Martinez is a Ph.D. student in Economics at U. of Florida. *Alternating Currents: Electricity Markets and Public Policy*, Washington DC: Resources for the Future, page(s) 192]

Regulation also can greatly affect the ability of power companies to expand the generators they already have in a region or to construct new plants. We are thinking here not so much of the traditional regulation of power as of the policies such as zoning and environmental protection that can make this construction more expensive and less expeditious—if not prevent it altogether. Policies that control the location and construction of power plants and transmission lines can clearly provide benefits. Few of us want a generator next to where we live or transmission lines running through our neighborhoods and parks. We only point out that the cost of these policies can be more expensive and less reliable electric power.

Link: ↓ Coal = ↑ Blackouts

Electricity Demand is rising. Fewer coal-fired plants brings greater risk of blackouts.

National Energy Technology Laboratory '08

[Prepared by: Peter C. Balash, NETL/OSAP, and Kenneth C. Kern, NETL/OSAP, "Natural Gas and Electricity Costs and Impacts on Industry," DOE/NETL-2008/1320, A White Paper on Expected Near-Term Cost Increases. April 28, 2008. National Energy Technology Laboratory, U.S. Department of Energy, **http://www.netl.doe.gov/energy-analyses/pubs/NatGasPowerIndWhitepaper.pdf** pages 3-4, download date: 6-20-08]

Current projections of electricity generation growth, and in particular sales to industry, are only 1.1% and 0.1% per year, respectively, according to EIA Annual Energy Outlook 20082. In fact, industrial sales growth is deemed to turn negative after 2017. This appears to be an extrapolationof the most recent period, encompassing the blows to industry caused by the fuel price run-up, a manufacturing recession centered in Ohio, and industrial retrenchment in California and New York (see Figure 3).

Even then the growth rate used for the projection (1.1%) does not reflect recent averages (1.7% - Figure 4). Extrapolating based on a time period with these embedded events will likely underestimate electricity consumption over the next few years, once the current economic slowdown is resolved. Worse, underestimation of industrial growth over the longer term risks becoming a self-fulfilling prophecy, as demand uncertainty may lead to failure to install enough electricity generation capacity, causing the price of electricity to rise needlessly and further weakening U.S. industry.

The current push by certain interest groups to forestall the construction of coal fired power plants, reminiscent of opposition to nuclear power, threatens to:

a. reduce already precarious reserve margins, raising the risk of blackout, and

b. increase the demand for natural gas in the short to medium term.

Expecting natural gas generation to displace coal-fired generation is, at best, problematic. By 2016, in the absence of 18 GW of currently forecast new coal-fired plants, the addition of natural gas plants to supplant these kWh would demand 1.4 Tcf/year, or almost all of the presently forecasted LNG growth. If electricity growth is higher, in line with AEO'05 estimates, due to better macroeconomic performance, an additional 2.3 Tcf of natural gas for gas-fired generation would be needed.

Link: ↓ Coal & Nuclear

Lack of new coal and nuclear plants brings huge shortages and blackouts by 2016

National Energy Technology Laboratory '08

[Prepared by: Peter C. Balash, NETL/OSAP, and Kenneth C. Kern, NETL/OSAP, "Natural Gas and Electricity Costs and Impacts on Industry," DOE/NETL-2008/1320, A White Paper on Expected Near-Term Cost Increases. April 28, 2008. National Energy Technology Laboratory, U.S. Department of Energy, **http://www.netl.doe.gov/energy-analyses/pubs/NatGasPowerIndWhitepaper.pdf** page 8, download date: 6-20-08]

The Eastern Interconnect (all regions excluding ERCOT and WECC) is in dire need of new capacity to ensure safe reserve margins by 2016 (Figure 8). The loss of new coal plants will reduce reserve margins well below these levels for most of the country, other than ERCOT (Texas) and SPP. However, since SPP is in the "East" its surplus will be drawn off by the grid. Should nuclear power also not be available before 2016, the entire Lower-48, save ERCOT, will be at high risk of power shortages, a present-day South African-like, electricity supply situation.

Link: ↓ Coal via Climate Legislation

Anti-coal climate legislation would cause a spike in natural gas costs, and crush the economy

National Energy Technology Laboratory '08

[Prepared by: Peter C. Balash, NETL/OSAP, and Kenneth C. Kern, NETL/OSAP, "Natural Gas and Electricity Costs and Impacts on Industry," DOE/NETL-2008/1320, A White Paper on Expected Near-Term Cost Increases. April 28, 2008. National Energy Technology Laboratory, U.S. Department of Energy, **http://www.netl.doe.gov/energy-analyses/pubs/NatGasPowerIndWhitepaper.pdf** page 9, download date: 6-20-08]

In Figure 9, consumption in 2008 of natural gas by combined cycle units will be about 5.1 Tcf. From Figure 5, an additional 3.7 Tcf of natural gas would be needed to replace expected coal plants and accommodate higher growth. In the event of climate change legislation, running existing natural gas combined cycle units at higher capacity factors can displace 20-35% of current coal kilowatt-hours (Figure 6). Such substitution requires another 5.4 Tcf per year. Clearly, the existing natural gas fleet cannot meet the growth in peak demand expected before 2016 and also substitute for coal to meet carbon caps. More plants would be needed, resulting in the incremental natural gas requirements of Figure 9.
Since the approximate 9 Tcf increase in natural gas consumption would be occurring at high prices, the impact on the economy would be severe. Since both power and heating prices would escalate, no sector would be exempt, but energy-intensive industry and residential sectors would certainly bear the heaviest burden.

Link: Cap-and-Trade

Strict Cap-and-Trade results in price spikes, electricity shortages, and blackouts. These would cripple the economy in the short term, before new tech arrives

National Energy Technology Laboratory '08
[Prepared by: Peter C. Balash, NETL/OSAP, and Kenneth C. Kern, NETL/OSAP, "Natural Gas and Electricity Costs and Impacts on Industry," DOE/NETL-2008/1320, A White Paper on Expected Near-Term Cost Increases. April 28, 2008. National Energy Technology Laboratory, U.S. Department of Energy, **http://www.netl.doe.gov/energy-analyses/pubs/NatGasPowerIndWhitepaper.pdf** page 9-10, download date: 6-20-08] [Note: Italics in original]

There is however, one scenario, becoming increasingly likely, that could bring to pass high natural gas plant utilization, low to dangerous reserve margins, and the collapse of U.S. industrial competitiveness. A climate change bill with relatively strict cap and trade provisions, such as S.2191, combined with the attempted moratorium on coal and likely delay of nuclear would severely impact the U.S. economy as it attempts to adjust.

Electricity and natural gas-intensive industry will be targeted. These effects have been minimized by most analyses because they neglect the vicious cycle between the prices of natural gas and of carbon dioxide; in the short term, under a cap and trade, the price of carbon must be high enough to displace coal kilowatt-hours. Only natural gas generation can do this at sufficient scale. Most analyses assume cheap and plentiful natural gas, early nuclear, or unlimited biomass, each a problematic assumption. While states with high rates of coal use will be most immediately affected, the knock-on natural gas demand effects will be widespread. Due to the increase in natural gas demand as coal power is backed down, the price of natural gas will rise dramatically across the country, not only in coal-using regions. *As the natural gas price rises, coal plants regain competitiveness, necessitating a further rise in the carbon dioxide allowance price, in order to meet the cap.* A price of $14/mmBtu, usually seen only in peak days in the Northeast, could be come commonplace. (This price equates to a price of oil of $84/barrel at a 6:1 energy equivalence ratio and $112/b at a more normal 8:1 ratio). The combined effect of high fossil fuel prices and a carbon dioxide allowance price of $30/ton would drive the average MWh cost to well over $110/MWh in natural gas-heavy regions (Figure 10). In fact, in Figure 10, the absolute cost increase of electricity is 31% higher in natural gas-intensive regions than in coal-intensive ones. On top of the already precarious reliability situation, shortages of natural gas and power may occur before relief arrives with advanced, but expensive, power generation technologies.

Conclusion

Since 2001, perceptions of natural gas supply and consumption have been successively ratcheted down, without any assurance the decline has halted. Nonetheless, recognition of the extremely difficult natural gas supply situation facing the United States has not been fully appreciated in recent energy and climate change analyses. Policies that encourage the use of natural gas to substitute for coal in power generation could very well lead to spectacular price increases for households and industry. As prices are pushed higher the need for more LNG will create closer links to the world oil price, setting the stage for the marginal price of U.S. electricity to be set by the whims of foreign oil/LNG suppliers, for the first time in U.S. history. This blind eye towards U.S. energy security extends to the inability to recognize that the nation's coal supply could help the U.S. forestall this situation. The current opposition to baseload power, and in particular coal-fired plants, in anticipation of climate change legislation, will have serious and damaging implications for the reliability of electricity supply and the viability of the U.S. economy in the initial, costly period of adjustment to a carbon control paradigm.

Link: Nuclear

Nuclear Plants shut down during local crises, risking complete grid failure

Lovins and Sheikh, Rocky Mountain Institute, '08

[AMORY B. LOVINS, Cofounder, Chairman, and Chief Scientist of Rocky Mountain Institute (www.rmi.org) and has published in 29 books and hundreds of papers, his work has been recognized by a MacArthur Fellowship (1993). He has consulted for more than three decades for major firms and governments (including the U.S. Departments of Energy and Defense) on advanced energy and resource efficiency in ~50 countries, has advised scores of electric utilities and has led the technical redesign of >$30 billion worth of facilities. IMRAN SHEIKH, RMI Research Analyst, is now a graduate student at the Energy and Resources Group of the University of California at Berkeley. "The Nuclear Illusion," 27 May 2008, DRAFT subject to further peer review/editing, http://www.rmi.org/images/PDFs/Energy/E08-01_AmbioNuclIllusion.pdf download date: 6-21-08]

Unlike scheduled outages, many nuclear units can also fail simultaneously and without warning in regional blackouts, which necessarily and instantly shut down nuclear plants for safety. But nuclear physics then makes restart slow and delicate: certain neutron absorbing fission products must decay before there are enough surplus neutrons for stable operation. Thus at the start of the 14 August 2003 northeast North American blackout, nine U.S. nuclear units totaling 7,851 MW were running perfectly at 100% output, but after emergency shutdown, they took two weeks to restart fully. They achieved 0% output on the first day after the mid-afternoon blackout, 0.3% the second day, 5.7% the third, 38.4% the fourth, 55.2% the fifth, and 66.8% the sixth. The average capacity loss was 97.5% for three days, 62.5% for five days, 59.4% for 7 days, and 53.2% for 12 days— hardly a reliable resource no matter how exemplary its normal operation. Canada's restart was even rougher, with Toronto teetering for days on the brink of complete grid failure despite desperate appeals to turn everything off. This nuclear-physics characteristic of nuclear plants makes them "anti-peakers"—guaranteed unavailable when they're most needed.

LINK: More participants, more generators

Link: Increase in the number of electricity generators increase risk of grid failure

Brennan, Economics Professor, Maryland, '02

[Timothy J., Professor of Policy Sciences and Economics, University of Maryland, Baltimore Country, and a senior fellow at Resources for the Future (RFF); Karen L. Palmer is a senior fellow at RFF; Salvador Martinez is a Ph.D. student in Economics at U. of Florida. *Alternating Currents: Electricity Markets and Public Policy*, Washington DC: Resources for the Future, page(s) 121-122]

Unlike the distribution grid, the security of the bulk power transmission grid is a classic example of what economists refer to as a public good. If a utility makes an investment or curtails a power transaction to maintain system security, not only will that utility and its customers benefit from that action, but all the utilities and customers attached to the grid will also benefit. Because all the benefits of promoting system security cannot be captured by the utility making the investment, if left to their own devices, utilities will tend to spend too little on security-enhancing activities and seek a free ride on the efforts of others.

This problem of free riding is less of an issue if utilities do not compete with one another and are subject to rate-of-return regulation (see Chapter 8). In a world with interconnected, vertically integrated and regulated electric power monopolies, utilities do not have to worry about how investments they make to improve grid security might benefit their competitors because they have no competitors. Moreover, when costs are fully recoverable through regulated rates, the utility has no incentive to skimp on expenditures to support system security.

As markets become more competitive, however, utilities are likely to be much less willing to make expenditures voluntarily that will benefit the larger community of grid users, some of which are their direct competitors. Some fear that under competition utilities will reduce grid-related maintenance expenditures and seek to push the costs of maintaining system security off onto others. Competition also creates greater incentives to reduce costs, which make utilities even less willing to make nonessential or nonmandated expenditures for which their customers are not willing to pay.

Competition has already begun to increase the number of participants and the volume of transactions in wholesale electricity markets, with associated increases in power shipments. Even greater increases are expected as more retail markets open to competition. This increased volume of power transactions and shipments brings with it an increase in the probability that some component of the transmis¬sion grid will fail. This higher probability of failure, in turn, creates an enhanced need for system security measures.

Increased participation in electricity markets by a wide variety of players—ranging from power marketers and brokers to independent "merchant" generators—further complicates the problem of assigning the responsibility to maintain reliability. Traditionally, in most NERC reliability regions, the quantity of spinning reserves (see Chapters 2 and 10) and other reliability-related or ancillary services necessary to maintain system security were centrally determined and procured by PCA operators, and the costs of those services were averaged over all system users. But in a competitive world, some market participants may desire different charges based on each user's contribution to system reliability. For example, some would argue that utilities or independents that have longer or more frequent unexpected outages of their generators should pay a greater share of the cost of reserve generation than other system users.

Link: Unbalanced Electrical Loads

Link: Unbalanced electrical load causes system-wide Blackouts

Brennan, Economics Professor, Maryland, '02

[Timothy J., Professor of Policy Sciences and Economics, University of Maryland, Baltimore Country, and a senior fellow at Resources for the Future (RFF); Karen L. Palmer is a senior fellow at RFF; Salvador Martinez is a Ph.D. student in Economics at U of Florida. *Alternating Currents: Electricity Markets and Public Policy*, Washington DC: Resources for the Future, page(s) 107-108]

Perhaps the most crucial feature that distinguishes electricity from other commodities is the need to keep supply equal to demand on a virtually minute-by-minute basis. For most other commodities, buyers can wait a bit if the item is not on the shelf, or the line on the telephone is busy. Sellers sometimes may have to backorder items not on the shelf, or keep inventory around a little longer when items do not sell as fast as expected. Both of these can be costly and inconvenient, to be sure. But they are not catastrophic in the way that a mismatch between electricity demand and supply can be. If more electricity is demanded than generated, brownouts or blackouts follow. If more electricity is supplied than used, the heat from the extra energy can damage the transmission and distribution systems.

Keeping electricity supply just equal to demand, by varying either production or use, is called load balancing. Two properties of electricity exacerbate the problem of keeping loads balanced. First, the cost of storing electricity in substantial quantities is prohibitive. If one is worried that the store will run out of soup or toilet paper, one can keep some spare supplies in a cupboard or closet. A seller that thinks that demand could be stronger than expected can keep an inventory of the commodity available on the shelves or in the warehouse. Neither tactic is available for electricity. Batteries are too expensive to store much power for most users, and at least up to now, generation on-site is prohibitively costly for all but large factories or commercial facilities that co-generate electricity as a by-product of energy available from other production processes or space heating systems. Hence, when users want electricity, the generators have to be producing it at that moment, and the transmission and distribution grids have to be able to deliver it.

The second problem is that load imbalances take down the entire system or entire regions within the system, not just those who are customers of a particular power company that happens not to be producing enough to meet their demands. The power produced by everyone essentially becomes part of a common pool from which all users draw. If what is there does not suffice, all customers on that grid lose, even if the cause of the insufficient supply is a failure to produce by one generator or unanticipated demand from just its customers.

Unless or until technology becomes available with which a distribution system can rapidly cut power to users of a particular generation company, failure to balance loads by one company potentially harms all. Similar problems occur with producing more power than buyers use at any given time. Moreover, unless the power usage of each customer can be monitored on a minute-by-minute basis—as opposed to reading the meter once a month—it may he impossible to know whether a particular generator is supplying less or more power than its users need.

In short, the inability to store large amounts of electricity means that supply must constantly be kept equal to demand. The system wide nature of the effect means that the costs of failing to keep loads in balance are borne by everyone on a grid and not just the company that happens to be out of balance. Accordingly, a laissez-faire attitude may not work. At a minimum, generators that get out of balance with respect to their customers' loads have to be responsible for procuring the additional power or cutting back production, as necessary, to restore the appropriate balance. Providing an incentive to ensure such responsibility means, in some way, holding generators liable for the costs imposed when they get out of balance.

If these incentives do not work, the responsibility to ensure that loads are balanced falls to the relevant grid manager—the local distribution company and, perhaps, the regional transmission organization, either an independent system operator or a transmission company managing the transmission system (see Chapter 7). As we will see below, this creates an ongoing role for these regulated wire monopolies in ostensibly competitive power markets. Moreover, the need for load balancing may lead wire operators to go beyond procuring power and network management to ensure balanced loads. In some states, wire operators have begun to manage the overall market for power and, in effect, continue to exercise the authority over the dispatching of power that they held before the advent of restructuring.

Internal Link: Blackouts Spread

The Grid lacks proper infrastructure investment. Local failures spread at the speed of light to other regions, causing a massive blackout

Makovich, Cambridge Energy Research Associates, '03

[Larry, Senior Director of Americas Research at CERA, Capital Hill Hearing Testimony, FDCH, Committee: House Energy and Commerce, Headline: Power Blackouts, September 4, l/n]

As power system conditions change (supply, demand, weather, etc.), power flows reroute at close to the speed of light. Thus, when a generating unit and a transmission line trip and power reroutes, several transmission lines carry more power and, as expected, begin to sag. On August 14, one of these lines carrying more power near Cleveland sagged close enough to a tree to short circuit. Proper maintenance (tree trimming) should prevent such contact but, again, transmission line failures of various types are something power system operators also plan for. Nevertheless, when power rerouted along the remaining lines, additional overloading occurred and automatic protections for generating plants and transmission lines disconnected additional power plants and lines in the network. At some point, the multiple failures pushed the system past its limits to isolate and restabilize. Consequently, the problem expanded over a larger area of the power network as significant rerouting of power flows continued.

When a power system is not configured to contain a normal component failure, the destabilization of a larger part of the power system quickly follows. Power surges spread through some parts of the network-Pennsylvania, New Jersey and Maryland, and AEP-that reacted (both automatically and with discretion) to isolate themselves in order to maintain stable system operations. However, such actions add to the rerouting dynamics of the remaining power network and begin to overwhelm the remaining parts such as eastern Michigan, Ontario, and finally New York.

The root cause of the cascading blackout appears to be a breakdown in the planning, coordination, and communication necessary to control the interconnected power systems. The sequence of events in the blackout caused parts of the power system to act on their own rather than in a coordinated fashion. Such coordination has not gotten the proper investments of time, money, and systems in the past several years and this system deterioration-the cumulative effects of years of underinvestment in the varied needs of transmission networks-is a root cause of the blackout.

Past Efforts to Prevent and Minimize Blackouts

The blackouts of 1965 and 1977 in the Northeast and in 1996 in the West spurred efforts to prevent and minimize blackouts in the future. The lesson from 1965 was that greater integration of regional power systems created desirable day-to-day benefits from electric trade but required an associated higher level of planning, coordination, communication, and control to prevent cascading power outages. As a result, the formation of the North American Electric Reliability Council (NERC) and its regional reliability councils followed the 1965 blackout.

The lesson from the two blackouts of 1996 in the West was that a breakdown in planning, coordination, communication, and control can allow normal events-again, in one case, a power line sagging into a tree-to cascade into a large regional system failure. In this case, the cascading failure began with federally owned transmission assets that were highly integrated with other publicly and privately owned transmission infrastructure. Following the 1996 blackouts, the western power system decreased the amount of power flowing on transmission lines (forgoing savings from increased power trade) in order to maintain the level of redundancy necessary to prevent a repeat of cascading failures following normal component failures. A year or more passed before the planning and coordination got to the point that these power transfer limits could return to pre-blackout levels.

The blackouts of 1977 in New York and several years ago in Chicago highlighted the problem of underinvestment in power delivery systems. In Chicago the problem was underinvestment in distribution (the small wires near homes) rather than in transmission (the large wires that carry power long distances). Even the best planning and coordination to properly manage a power system cannot offset the problems created by continued underinvestment. Eventually the probability of multiple component failures and the increasing constraints on systems operators charged with configuring a reliable power system leads to a major blackout. This underinvestment affects more than just transmission lines and substations and includes computer systems, backup systems, software, instrumentation, data, rules, and organizations.

Internal Link: Blackouts Spread

Transmission failure spreads quickly across the continent

Wood, FERC Chairperson, '03

[Patrick, September 3, FDCH Congressional Testimony, COMMITTEE: HOUSE ENERGY AND COMMERCE, HEADLINE: POWER BLACKOUTS, BILL-NO: H.R. 6, l/n]

The Nation's transmission grid is an extremely complex machine. In its entirety, it includes over 150,000 miles of lines, crossing the boundaries of utilities and states, and connecting to Canada and Mexico. The total national grid delivers power from more than 850,000 megawatts of generation facilities. The grid is operated at about 130 round-the-clock control centers, some large and others small. The large number of these control centers derives from the historical development of utility-franchised territories.

When a generating facility or transmission line fails, the effects sometimes are not just local. Instead, a problem may have widespread effects and must be addressed by multiple control centers. The utility staff at these centers must quickly share information and coordinate their efforts to isolate or end the problem. Given the speed at which a problem can spread across the grid, coordinating an appropriate and timely response can be extremely difficult without modern technology.

In recent years, the use of the grid has expanded significantly. The growth of our economy, and its increasing reliance on electricity, is the principal driver. Greater competition among power sources (wholesale power competition) has also increased use of the grid.

The grid was built originally to interconnect neighboring utilities and to allow them to share resources when necessary but is now used as a "superhighway" for broader, regional trading.

Transmission capital investments and maintenance expenditures have steadily declined in recent years. In the decade spanning 1988 to 1997, transmission investment declined by 0.8 percent annually and maintenance expenditures decreased by 3.3 percent annually. (Maintenance activities include such items as tree- trimming, substation equipment repairs, and cable replacements, all of which affect reliability). Power demand increased by 2.4 percent annually during this same time period.

Finally, perhaps even more important than adding transmission capacity, is improving the tools available to control center staff for operating the grid. One example is installing state-of- the-art digital switches, which would allow operators to monitor and control electricity flows more precisely than the mechanical switches used in some areas. Installing additional monitoring and metering equipment can help operators better monitor the grid, detect problems and take quicker remedial action. Improved communication equipment can help control centers coordinate efforts more quickly. The level of investment in these technologies has been varied.

Internal Link: Blackouts Spread

A blackout could race across the country. Every region has reliability problems and supply buffers are low.

Anderson '04

[Hil, "Analysis: Economy can warp power forecasts," United Press International, May 12, l/n]

The NERC report did find concerns in most of the reliability council territories, particularly in areas where large amounts of wholesale power are shuttled from one area to another.

** East Central Area Reliability, which is known as ECAR and covers the area of the Midwest where last summer's blackout began, is considered to be particularly vulnerable due to the "widely varying power flows from electricity transactions between different parts of the Eastern Interconnection."

Although ECAR will get some relief from the return of Ohio's 833 MW Davis-Besse nuclear plant to service, the movement of power eastward could clog up the transmission grid.

** Northeast Power Coordinating Council (NPCC) has gained more than 2,000 MW of nuclear power in southern Ontario since the blackout. There remains a tight supply margin that could lead to trouble in New York City, Long Island and Connecticut should weather conditions warrant.

** Southeastern Electric Reliability Council (SERC) has a number of new power plants in service; however NERC said much of the electricity they produce is meant for markets outside of Dixie. While the movement of power out of the area could cause transmission constraints, SERC has plenty of generating capacity to cover demand on sweltering days in the Deep South.

** Western Electricity Coordinating Council (WECC) is keeping its fingers crossed in hopes that California will be able to weather a summer that has already experienced temperatures above 100 degrees this spring. The Golden State's resources are considered adequate; however there is little margin for error and transmission constraints could make it difficult to rapidly import more power in a pinch.

** Mid-America Interconnected Network (MAIN), which includes parts of Iowa, Illinois and Wisconsin, will enter the summer without the 14-percent reserve margin recommended by NERC.

Internal Link: Blackouts ↓ Economy

Widespread failure of Information Technology would disrupt the Economy, plunge the world into a recession

Yardeni, Chief Economist, Deutsche Bank, '99

[Edward, The chief economist and global investment strategist of Deutsche Bank Securities in New York, "Risky Business With so much at stake, we must prepare for the worst and hope for the best," http://forum.ra.utk.edu/1999summer/riskybiz.htm Download date: 09-10-04]

Our global and domestic markets for financial securities, commodities, products, and services depend on the smooth functioning of the vast information technology structure. Because information is the life blood of our domestic and global markets, the Y2K computer problem poses risks to economies around the world. If the information flow is severely disrupted by Y2K, then markets will allocate and use resources inefficiently. Market participants will be forced to spend more time and money obtaining the information that was instantly available at almost no cost before the market was disrupted.

The division of labor could also be radically upset by Y2K. This process is the very foundation of economic prosperity and progress based on the exchange of goods and services produced as the result of our competitive advantage. We all either thrive, or have the potential to do so, by producing the goods and services that we are especially endowed, qualified, or trained to produce. We exchange the fruit of our labor for the goods and services that are better made by others.

Information technology systems have expanded the size of markets and the opportunities for an even greater division of labor. Just-in-time manufacturing, outsourcing, and globalization are the most obvious modern extensions of the division of labor. Now imagine a world in which those information technology systems are either impaired or completely fail. Suddenly we might all be forced to do without goods and services that can no longer be produced for us by others. We could attempt to make them ourselves, but in most cases that would be impossible. If it is possible, the cost and time of doing so will be enormous. There are no low-tech alternatives if our high-tech information systems fail in 2000. We simply cannot manually collect, sort, store, process, and analyze all the data we must have to support, let alone grow, our global economy.

Numerous experts, testifying at recent congressional hearings, have warned that serious computer malfunctions could play havoc with our military defense systems, electric power grid, telecommunications network, health care providers, and government tax collection and support payments. The economic and geopolitical upheaval caused by Y2K could be significant.

Indeed, I believe there is a 70 percent probability of a global recession in 2000. It could be as severe as the 1973-74 global downturn, which was caused by a disruption in the supply of oil. In a similar way, Y2K disruptions in the flow of information could cause a significant global recession. Blackouts and frequent brownouts are possible, especially overseas. In the United States, the phones might work, but the network could be saturated with callers attempting to deal with various Y2K problems, including buggy personal computers, erroneous bills, and undelivered tax refund checks. Overseas calls to important countries may be impossible to place for some time. This would be disruptive to world trade and to the just-in-time manufacturing system in the global economy.

In a plausible worst-case scenario, the global recession could last 12 months. Business failures would rise, as would jobless rates. The resulting political upheaval would be unpredictable. Protectionist backlashes could further depress world trade and cause deflation.

Internal Link: Blackouts ↓ Economy (Small business)

Blackouts devastate Small Businesses, they are the backbone of the US economy.

Business Wire '04
[Feb. 18, Headline: Most Small Businesses Powerless Against Blackouts; Consider Nation's Power Grid a Competitive Threat, New Survey Reveals, l/n]

Six months after The Great Blackout of 2003, more than 60 percent of America's nearly 23 million small businesses have no backup power supply and remain vulnerable to crippling electrical outages, according to a survey released today.
The 2004 Small Business Power Poll, commissioned by Emerson (NYSE: EMR), also reveals that small businesses see the need for protection - 75 percent say electrical power outages are a threat to their business - but only one in five feels very prepared to deal with an outage.
This is alarming, small business experts say, considering the economic high stakes at hand: Small businesses, which lost billions of dollars in productivity from power outages in 2003, generate 40 percent of the U.S. gross domestic product and create two-thirds of all new jobs. Eighty percent of small businesses experienced at least one power outage last year; 25 percent experienced three or more outages, according to the survey.
Importantly, however, the survey shows that the majority of small businesses (58 percent) are now interested in acquiring backup power technologies traditionally used by large businesses, citing that backup power would not only protect them, but also create a competitive advantage.
Emerson, a global leader in reliable power technologies, has seen a growing interest in emergency and standby power systems from small and home businesses since The Great Blackout.
"Since the August blackout and Hurricane Isabel, we've seen a significant upswing in interest from small businesses," Emerson President James G. Berges said. "Small businesses play a critical role in the health of our economy, and they need to know that today there is somewhere they can turn for reliable power technology to keep their operations running 24-7."
Brian Lutgen of Camtronics Medical Systems estimated that his company would lose approximately $100,000 a day in sales if it lost power. The Hartland, Wis.-based company manufactures network systems for medical facility cardiology departments.
"Backup power is extremely important to us," Lutgen said. "Patients are monitored by our equipment during cardiac procedures. We need continuous power at our facility to be able to log in and fix any systems while there is a patient on the table."
Nationally recognized small business expert and U.S. Small Business Administration National Advisory Board member Jim Blasingame said: "Small businesses are no longer just mom-and-pop, backwater entities; they are integrated partners with large corporations. Small businesses cannot afford to risk those vital relationships by being unable to perform when the power goes out. And this really applies to all small businesses. It won't take one more big blackout like we had last August before backup power becomes an absolute necessity for every small business."

Internal Link: Blackouts ↓ Economy

Electricity if Key to the Economy, especially the internet sector

Brennan, Economics Professor, Maryland, '02

[Timothy J., Professor of Policy Sciences and Economics, University of Maryland, Baltimore Country, and a senior fellow at Resources for the Future (RFF); Karen L. Palmer is a senior fellow at RFF; Salvador Martinez is a Ph.D. student in Economics at U. of Florida. *Alternating Currents: Electricity Markets and Public Policy*, Washington DC: Resources for the Future, page(s) 195]

Critical to the economy. Electricity is important not merely because the United States spends about 3% of its gross domestic product on power. A better measure of its importance may be to imagine how the rest of the economy and society at large depend on it. To take but one example, the defining adjective of the growth of the Internet as a business and communication tool is not "silicon" or "digital" or "software," but "electronic, as in "electronic commerce."

Internal Link: Blackouts ↓ Economy - IT

Grid failure and blackouts hurt the economy. Information Technology increasingly requires a huge and stable electric supply. Even tiny interruptions can causes damage to sensitive equipment.

Katz '04

[Alan, Senior Product Manager at MGE UPS Systems in California, *Electrical Consumption and Maintenance*, June 1, "Maintaining Facility Power in the Age of the Blackout," l/n]

Even though the nation's power grid is said to be 99.9% reliable, the typical U.S. business will endure about 14 power quality "events" per year. "Event" is defined as any deviation in power quality that may affect the performance of a customer's load - not just outages. Not only that, the average residential customer will experience 90 minutes of outages per year, most of which will be distribution-related.
The power grid isn't the only problem. The demand for electricity continues to grow at roughly 2% to 3% annually. This is a scary trend for a saturated grid that now uses 3.6 trillion kWh of power. Certain regions like Manhattan, N.Y., for example, are experiencing staggering increases in power demand, up by as much as 25% versus a few years ago.

This jump is largely attributed to an increase in the installation of digital/IT equipment and the power necessary to keep it cool, which can often rival the power of the equipment itself, resulting in a double hit to the grid. Since 1980, as much as 90% of the growth in energy demand can be attributed to supplying power to digital power-sensitive loads and 9% of the nation's current energy is estimated to be used to power digital devices.

Environmental regulations, coupled with other obstacles that stand in the way of expanding the nation's generating capacity, make powering the new digital economy a challenge.

While utilities define an outage as a power interruption of five minutes or more, most electronic devices and IT equipment are only designed to sustain interruptions of about eight milliseconds or less. Therefore, any business that intends to run without interruption must have some sort of power conditioning/backup power source in place. Today, it's estimated that 3% to 5% of the grid is fortified with an uninterruptible power supply UPS along with 80 gigawatts GW of off-grid generating capacity roughly 10% of the grid's capacity installed for longer duration backup. And much of the infrastructure aimed at guarding against interruptions is dedicated to short-duration outages, not against longer outages like those experienced in recent blackouts.

Internal Link Booster: Tiny interruptions ↓ Economy

Even split-second interruptions and voltage sags can cripple economic activity. Tens of thousands are affected daily.

McGranahan et al '04

[Mark McGranaghan is the vice president of Consulting Services at EPRI PEAC Corp. Knoxville, Tennessee, U.S. He received BSEE and MSEE degrees from the University of Toledo and a MBA from the University of Pittsburgh. John Blevins is manager of Power Quality Services at Salt River Project, a public power and water company serving the metropolitan Phoenix area and portions of eastern Arizona. Marek Samotyj is program director of the Consortium for Electric Infrastructure to Support a Digital Society CEIDS, an initiative established by EPRI and the Electricity Innovation Institute in 2001 to ensure an adequate supply of high-quality, reliable electricity to a digital economy and integrate energy users and markets. He received a MSEE degree from Silesian Technical University in Poland and a MS degree engineering-economic systems from Stanford University. *Transmission and Distribution World*, Feb. 1, 2004, "Optimizing Power Quality and Reliability Initiatives," l/n]

On Aug. 14, 2003, 22 million customers lost power in the Northeast Blackout, an event that brought worldwide attention to the issues of infrastructure security and reliability. Cost estimates for this event are on the order of US$6 to $8 billion.
What many people don't realize is that 500,000 customers in the United States alone lose power every day for an average of about two hours. The number of customers affected by momentary interruptions and voltage sags is even greater. These shorter duration events are most important for industrial customers. Power disturbances ranging from milliseconds voltage sags to several seconds momentary interruptions impact industrial processes. A 0.1-second event, which literally is the blink of an eye, can cause a refinery to shut down or a semiconductor processing plant to stop production. Once down, it often takes hours to bring a line back to normal production.

Even momentary interruptions in power can cripple banks and manufacturing

McGranahan et al '04

[Mark McGranaghan is the vice president of Consulting Services at EPRI PEAC Corp. Knoxville, Tennessee, U.S. He received BSEE and MSEE degrees from the University of Toledo and a MBA from the University of Pittsburgh. John Blevins is manager of Power Quality Services at Salt River Project, a public power and water company serving the metropolitan Phoenix area and portions of eastern Arizona. Marek Samotyj is program director of the Consortium for Electric Infrastructure to Support a Digital Society CEIDS, an initiative established by EPRI and the Electricity Innovation Institute in 2001 to ensure an adequate supply of high-quality, reliable electricity to a digital economy and integrate energy users and markets. He received a MSEE degree from Silesian Technical University in Poland and a MS degree engineering-economic systems from Stanford University. *Transmission and Distribution World*, Feb. 1, 2004, "Optimizing Power Quality and Reliability Initiatives," l/n]

As described previously, the costs associated with power outages can be tremendous. A single outage can cost a manufacturing facility anywhere from $10,000 to millions of dollars. Costs to banks, data centers and customer-service centers can be just as high if not higher. Unfortunately, these facilities can be sensitive to a wider range of PQ disturbances than outages counted in utility-reliability statistics. Momentary interruptions or voltage sags lasting less than 100 msec can have the same impact as an outage lasting many minutes.

Internal Link: Grid Failure = ↓ US Economy

Brief power disruptions hurt businesses. Just one minute of downtime costs VISA almost 2 million dollars.

PR Newswire, '04

[SECTION: WASHINGTON DATELINE; HEADLINE: One Year and 10 Seconds Later: Northeast Blackout Anniversary Offers Reminder of Importance of Emergency Backup Power; Essential Tips on How Businesses Can Avoid Losses During a Power Outage; SOURCE Diesel Technology Forum. August 10, Lexis-Nexis]

One year ago this week, on August 14, 003, the Northeastern United States and parts of Canada suddenly went dark due to failures in the electric power grid that lasted nearly 48 hours in some areas, resulting in severe inconveniences for millions and business losses estimated in the billions. With a comprehensive U.S. energy package stalled in Congress, many are no more confident that the nation's power grid is any more reliable today than it was then -- all at a time when power reliability is more critical than ever, and the economic impact can be devastating.
"Reliable electric power -- even in times of grid failure -- is now considered mission-critical to business operations, so that even a brief disruption in power can mean millions," said Allen Schaeffer, executive director of the Diesel Technology Forum. According to a study by Contingency Planning Research in Teleconnect Magazine, the brokerage industry, for example, loses $6.4 million per hour when power outages interrupt operations. Additionally, according to data reported in The Wall Street Journal (July 23), one minute of downtime for the VISA USA network represents $1.92 million in lost transactions. Across all business sectors, it is estimated that the U.S. economy loses between $104 billion and $164 billion a year due to utility power outages, as reported in a study by the Consortium for Electric Infrastructure to Support a Digital Society (CEIDS).

Internal Link: Grid Failure = ↓ US Economy

Electricity outage rips through the economy, touching all aspects of our lives

Fellmeth, Professor of Public Interest Law, San Diego, ’02

[Robert C., Professor Fellmeth is a graduate of Stanford University (A.B. 1967) and Harvard University (J.D. 1970). He is a former state and federal antitrust prosecutor and, in 1979, founded the Center for Public Interest Law (CPIL), a statewide advocacy group centered at the University of San Diego School of Law; Loyola University Chicago Law Journal, Summer, 33 Loy. U. Chi. L.J. 823, ARTICLE: Plunging Into Darkness: Energy Deregulation Collides with Scarcity, l/n]

Energy is the paradigm economic sector where scarcity is concerned. It is one of the few products for which service is provided on a blank check basis. First we use the service, and then we are billed. In the long run price changes may influence demand, but not in the short run. Electricity is also an underlying product. Substantial investment has been made relying on its availability at predicted levels and costs. That investment permeates our society, from refrigeration and indoor ambient temperature to the pizza ovens of the corner restaurant to the lights at intersections, on the streets, and at the public university. It touches virtually every aspect of our lives. Its unexpected unavailability causes a ripple effect of disruption and damage far beyond the energy industry's own domain.

Internal Link: Electricity key to Economy

Electricity is Key to the Economy

Brennan, Economics Professor, Maryland, '02

[Timothy J., Professor of Policy Sciences and Economics, University of Maryland, Baltimore Country, and a senior fellow at Resources for the Future (RFF); Karen L. Palmer is a senior fellow at RFF; Salvador Martinez is a Ph.D. student in Economics at U. of Florida. *Alternating Currents: Electricity Markets and Public Policy*, Washington DC: Resources for the Future, page(s) 65]

Electricity is undeniably crucial to the economy. The roughly 3% of the gross domestic product we spend on it—itself a huge number—understates the degree to which our households, offices, shops, and factories depend on it. Moreover, the technology for producing electricity is, relative to other industries, relatively stable (albeit to varying degrees).

Internal Link: Low Reliability ↓ Economy

Grid is still vulnerable to massive blackout, causing economic damage. But eight other types of minor disruptions also costly to businesses

Woolner ’04

[Rob, vice president of Canadian operations at Powerware, a global provider of AC and DC power-protection systems, power-management software and professional services, *Electrical Business*, February, HEADLINE: “Beyond blackouts: protecting sensitive systems from silent killers,” lexis-nexis]

From the brownouts that rolled across California in 2001 to the massive outages that darkened Ontario and the northeastern U.S. on August 14, it's clear that as much as we rely on the public utility grid, it is vulnerable.

The August 14 blackout shut down more than 100 power plants in the U.S. and Canada, knocked out power to 50 million people and sparked the biggest monthly drop in economic activity in Ontario in more than a decade (GlobeInvestor.com). Although some analysis felt the Canadian economy could absorb the anticipated multi-million dollar losses, Anderson Economic Group considered all possible impacts and forecast a potential impact closer to CDN $6.6 billion. Clearly, losing electricity is an expensive proposition.

Power disturbances, however, are costly as well. We are increasingly reliant on electricity and, at the same time, our demands are undermining the power grid's ability to supply it. While governments and public utilities need to work on strengthening the grid, the private sector has to assume responsibility for guaranteeing supplies of critical power to their own operations.

Arresting the silent killers

Users may only notice power disturbances when the lights flicker or go out, but sensitive electronic equipment is aware of, and is damaged by, many other hidden anomalies - even some that are caused by the equipment itself. A commercial customer on typical utility power will be subjected to power problems daily and four to 15 complete outages per year. Here are the nine key issues of concern:

Total power failure

A total loss of utility power occurs when voltage falls below 80 V for several cycles or more. This can be caused by a number of events, including lightning strikes, downed power lines, transformer malfunctions, over-demands on the power grid, accidents, weather conditions and natural disasters. In most systems, a power failure can cause any or all of the following conditions: file/data corruption or loss, hardware or firmware damage, and system lock-ups.

Power sag

Power sag is defined as a drop of at least 10 per cent from normal utility-line voltage for a half cycle or more. Power sags are triggered by various load and switching mechanisms in the utility grid, or can be caused by equipment itself. For example, when a motor gears up to 6400 rpm, it draws up to nine times its normal load from the power grid, making it difficult to keep voltage within tolerances. It's not uncommon for a power-hungry piece of equipment to gulp 10, 15 or 20 A when it starts up. Even though sags usually last only a few cycles or seconds, the sudden dip in voltage can cause corruption or loss of data, flickering lights, equipment shut-off or malfunction with automatic shut-off.

Power surge

A power surge, the opposite of a power sag, is a short-term increase in voltage of 110 per cent or more above the nominal supply voltage. It's often caused by large electrical loads turning on and off in the utility grid. The extra heat from high voltage overwhelms and damages circuitry in digital imaging systems. The system may corrupt or lose data, malfunction or simply shut off.

A short, intensive surge is known as a "spike." Spikes are most commonly associated with lightning strikes, which can send line voltages above 6,000 V. But spikes can just as easily happen when backup generators kick in (a 50-V spike wouldn't be unusual), and can even be caused by the equipment itself. Spikes are particularly destructive to electronics because circuits cannot absorb the heat of such high-energy content.

Undervoltage

Also known as a "brownout", an undervoltage condition occurs when voltage drops 10 per cent below normal voltage yet remains above 80 V (the threshold for power failure). Brownouts may be intentionally induced by utilities for a few minutes or days to conserve power during periods of peak demand. Brownouts can cause data loss and corruption, and premature hardware failure when the equipment's internal power-supply component draws more current to make up for the drop in voltage.

Overvoltage

The reverse of undervoltage, overvoltage, is increased voltage for a period of time. Overvoltage doesn't happen often, but it can accompany rapidreduction in power loads, shut-off of heavy equipment or utility switching. Overvoltage can cause extensive hardware damage, including burned-out circuit boards, component stress or loss, memory loss, data loss and data errors.

Line noise

Electrical line noise is a high-frequency waveform caused by radio frequency interference (RFI) or electromagnetic interference (EMI). These common interferences can be generated by local or remote influences. Equipment such as transmitters, welding devices, printers, lightning and electrical equipment can generate RFI and EMI. Varying degrees of disruption can occur from simple keyboard lock-ups to program failures, data crashes and data corruption.

Frequency variation

When viewed with an oscilloscope, normal alternating current (AC) produces uniform waveforms. IT systems, laboratory instruments and production systems typically expect to receive AC power oscillating at 60 Hz. Systems can tolerate slight differences but a significant deviation, even briefly, can cause problems.

The regular sine wave frequency of healthy AC power can be distorted by fast, transient spikes - often from electronic equipment feeding internal noise back into the power line. Power that is delivered with an irregular and abrasive waveform can cause internal system components to degrade and fail. While components are degrading, system technicians may notice a higher incidence of data errors, system and communication lock-ups and resets in the equipment.

Switching transients

Switching transients, extremely brief periods of undervoltage or overvoltage, do their damage in mere nanoseconds - far less time than a sag or spike. Damage may be incurred in both hardware and software, resulting in burned circuitry, component stress or failure, and memory anddata losses.

Harmonic distortion

Harmonic distortion is the distortion of the normal line waveform. This condition is generally transmitted by non-linear loads, such as from equipment that places on-and-off demands on the power supply. This means that harmonic distortions can be caused by everyday equipment found in any commercial setting, such as switch-mode power supplies, variable-speed motors and drives, pumps, heaters, robotics, copiers and fax machines - anything with variable power consumption. Harmonic distortions can cause communication errors, overheating and hardware damage, or premature failure.

Internal Link: ↑ Reliability = ↑ Economy

Increase in grid reliability boosts Productivity and Jobs

Associated Press '03

[By DIANE SCARPONI, Associated Press Writer, HEADLINE: Study: Better electric reliability would boost economy, November 25, l/n]

A more reliable power grid would boost business productivity and create jobs, but Connecticut residents are reluctant to pay for it, experts at a quarterly economic conference said Monday.
A study by the Center for Economic Analysis at the University of Connecticut found that a rate increase used to improve the state's electric system would create 6,500 new jobs, boost incomes $400 million and increase gross state product $600 million each year on average over the next 11 years.
Many of those jobs would come in construction, as the infrastructure improvements are built. But businesses also would save production time now lost during blackouts, voltage reductions and other power interruptions.
The study was paid for by the Connecticut Light & Power Co., which is seeking an 11 percent rate increase from the Department of Public Utility Control, in part to spend $1 billion improving the distribution and transmission system. UConn economists said CL&P had no editorial control over the study.
CL&P has argued it needs the rate increase to replace many of the wires and cables that bring power from plants to regional transmission lines and homes. Some of this infrastructure is 40 years old or more.
Consumer advocates and two state agencies - the Office of the Consumer Counsel and the state attorney general's office - oppose the rate increase as an excessive burden on consumers.
Economist Stanley McMillen said the costs of a rate hike to consumers and businesses would be "overwhelmed" by other benefits to the economy. Failing to improve the infrastructure would mean a loss of productivity, jobs and competitiveness, he said.

Impact: Chemical Plant Explosion

Small grid failure brings down the entire system – impact is chemical plant explosions, worse than atom bomb

Latynina 2003
[World Press Review (VOL. 50, No. 11) download date: 6-2-08 www.worldpress.org/Americas/1579.cfm]

The scariest thing about the cascading power outages was not spoiled groceries in the fridge, or elevators getting stuck, or even, however cynical it may sound, sick patients left to their own devices without electricity-powered medical equipment. The scariest thing of all **was chemical plants and refineries with 24-hour operations, which, if interrupted, can result in consequences even more disastrous and on a larger scale than those of an atomic bomb explosion.** So it is safe to say that Americans got lucky this time. Several hours after the disaster, **no one could know for certain whether the power outage was caused by an accident or someone's evil design**. In fact, the disaster on the East Coast illustrates just one thing**: A modern city is in itself a bomb, regardless of whether someone sets off the detonator intentionally or by accident**. As I recall, when I was writing my book Industrial Zone, in which business deals were bound to lead to a massive industrial catastrophe, at some point in time I was considering making a cascading power outage the cause of a catastrophe. Back then, I was amazed and shocked at the swiftness of the process**. Shutting down at least one electric power plant is enough to cause a drop in power output throughout the entire power grid. This is followed by an automatic shutdown of nuclear power plants, a further catastrophic drop in power, and finally a cascading outage of the entire grid system**.

Impact: Blackouts harm Public Health

Blackouts harm public health, causing dirty water, spoiled food, and ruined vaccines

Bragi '01

[David, "Health Watch: Rolling Health Hazards; Summer Blackouts May Pose Public Health Risks," http://www.sfgate.com/cgi-bin/article.cgi?file=/gate/archive/2001/05/07/healthwatch.DTL d/n date: 09-09-04]

The company's backup generators had failed to kick in and the ensuing power outage tripped a safety valve which shut down the compressor. After power was restored, the safety valve would not reopen, causing a leakage of sulfuric gas into the air. By the time workers plugged the leak, approximately 100 people, all in Richmond, had arrived at area hospitals with minor ailments.

Although not caused by the state's energy crisis, this electrical outage highlights how the prospect of chronic blackouts could pose some very real and unexpected threats to public health. So far we have been lucky, with planned rolling blackouts lasting no longer than about 90 minutes.

But if sudden, unexpected shortfalls in electrical supply cause outages lasting longer than a few hours, Californians may face such health hazards as unclean drinking water, food spoilage, vaccine shortages, heat stroke and disabled and elderly residents living without electricity.

For instance, widespread outages could affect the availability and safety of water supplies. Local water districts are concerned that the state Public Utilities Commission has not exempted their facilities, such as pumping stations that transport water uphill and treatment plants that purify water, from rolling blackouts.

"In addition to our own facilities, outages could affect the State Water Project and the Central Valley Project's ability to get water to us," said Marty Grimes, public information representative for the Santa Clara Valley Water District, which provides wholesale water supplies to Santa Clara County. On the retail level, some of the smaller suppliers lack large storage tanks and would themselves run out of water quickly.

If treatment plants go off-line, water quality might also decline in some areas, in which case consumers would have to boil their tap water for at least one minute before drinking it. "We are doing all we can to minimize this possibility and see it as unlikely," says Grimes. "If that were to happen, we'd be ready to inform everyone in the affected area immediately."

To help keep the water flowing during outages, the district has installed backup generators in treatment facilities and key pumping stations, and is keeping Anderson Reservoir as full as possible. "It is high enough in altitude that electricity is not needed to get the water to our treatment plants. Gravity does all the work," says Grimes.

The district also recommends that consumers use less water when the weather is very hot or outages are likely to occur. "In essence," says Grimes, "saving water can save energy."

Since refrigerators and freezers run on electricity, when the power goes out, so does your ability to keep perishables fresh. One health risk occurs when somebody carelessly reheats and eats yesterday's frozen casserole long after a blackout has already thawed it back to life.

"It goes way beyond spoilage," says Susan Conley, director of food safety education for the Food Safety and Inspection Service at the U.S. Department of Agriculture. "If, because of the blackouts, the temperature in the refrigerator or the freezer goes above dangerous levels, then you could have a problem with bacterial contamination," such as botulism.

Contrary to popular opinion, simply sniffing around is not a good way to tell whether food is safe to eat, since not all bacteria produce noticeable odors. A better course is to learn how to keep your food cold for as long as possible and which foods last for how long at what temperatures.

For instance, a blackout lasting under four hours will not spoil the food in your refrigerator. A freezer will keep frozen food safe for at least a day. To keep the cold air inside, keep refrigerator and freezer doors closed unless you absolutely need to retrieve food.

Some foods, muffins for instance, will last longer than others, such as eggs. For an easy-to-read spoilage chart that recommends when to use, refreeze or discard various foods, go to the USDA's Keeping Food Safe During A Power Outage page. It also has a collection of practical tips, such as safe temperature levels, using thermometers, and handling dry ice.

As for food spoilage at grocery stores, I asked a butcher at Armond's Quality Meats in El Cerrito how well the meats in the store's refrigerated glass display counter would hold up during an extended outage. He said they would keep the counter closed; since the case is kept at just above freezing, the meat would remain safe until the next day.

Medical facilities also rely upon refrigerators to keep perishables cold and safe. Unfortunately, like water facilities, smaller clinics and hospitals in California are not exempt from planned blackouts, although major hospitals are.

According to Dr. Barbara Ramsey, medical director the Native American Health Center's community health clinic in Oakland, if power goes down for more than two hours, their biggest problem will be vaccine spoilage. In addition, replacing them may also prove difficult if power outages to other clinics across the state or nation result in widespread shortages.

"We have episodic vaccine shortages without blackouts," she says, largely because drug manufacturers allegedly limit the supply of medicines to improve profit margins. "We just had one with tetanus. For those vaccines that aren't profitable, I would see a particular risk."

Ramsey recommends that parents of children between 15 months and 30 months and 4 to 6 years get them vaccinated as soon as possible, especially if they expect to enroll them in a school or day care center that requires inoculations prior to admission. Often, says Ramsey, "the parents go, 'Oh, the kid turned 4 but I've two years to do these vaccines.' Then suddenly the parent wants boosters given today because preschool starts tomorrow. But if I don't have the vaccine, tough luck."

Otherwise, having experienced a rolling blackout a few weeks ago, she gives mixed reviews about the clinic's ability to operate without power. Since the clinic is "a fairly low-tech operation," Ramsey says she is confident that it can continue to provide basic services, with the exception of the EKG machine and dental equipment. "Just to shine that light in your mouth requires electricity," she says.

Other medical issues must be dealt with in the home, especially for elderly and disabled residents. Medicines kept in the refrigerator can spoil, life-support equipment can shut down, and heat stroke can result in serious illness or death.

<u>Impact: ↓Economy = War</u>

Economic collapse leads to wars that go nuclear

Mead '92

[Walter Russell Mead, Senior Fellow for U.S. Foreign Policy at the Council on Foreign Relations, World Policy Institute, 1992]

<u>Hundreds of millions – billions – of people have pinned their hopes on the international market economy. They and their leaders have embraced market principles – and drawn closer to the west – because they believe that our system can work for them. But what if it can't? What if the global economy stagnates – or even shrinks? In that case, we will face a new period of international conflict: South against North, rich against poor. Russia, China, India – these countries with their billions of people and their nuclear weapons will pose a much greater danger to world order than Germany and Japan did in the 30s.</u>

AT: Back-Up Generators & Surge Suppressors Solve

Back-Up Generators and Surge Suppressors only solve a tiny fraction of the power. Systems of continuous generation are the best solution.

Woolner ’04

[Rob, vice president of Canadian operations at Powerware, a global provider of AC and DC power-protection systems, power-management software and professional services, *Electrical Business*, February, HEADLINE: Beyond blackouts: protecting sensitive systems from silent killers, l/n]

Generators and surge suppressors are not enough

Some companies consider themselves covered if they have backup generators and surge suppressors. However, these are band-aid solutions for systemic problems.

Backup generators address the most obvious power problem - complete loss of utility power - but provide no protection against the eight other power disturbances. Furthermore, it's not enough to switch to backup power in 10 to 30 seconds, when that interval is enough to lock up critical systems. Backup generators can even introduce switching transients during switch-over from utility power to generator power, and back again.

Surge suppressors address power surges, but have no effect on the undervoltage and variance conditions that can erode equipment health over time - or zap it in an instant.

Uninterruptible power systems (UPSs) augment and supersede these power-protection strategies while presenting a compelling business case in any commercial environment.

Continuous, clean power for always-on systems

A UPS performs two primary and complementary functions. It conditions incoming power to smooth out the sags and spikes that are common on the grid and other primary sources of power. And, it provides ride-through power to cover for sags and short-term outages (say, 30 minutes to an hour) by dynamically selecting and drawing power from the grid, batteries, backup generators and other available sources.

Three key types of UPSs are in use today:

Standby UPSs are an economical solution for applications that need only minimal power protection. With a standby UPS, the protected equipment runs off normal utility power until the UPS detects a problem, at which time it switches to battery power. Standby UPSs are best suited for home and small office computers.

Line-interactive UPSs regulate voltage by boosting input utility voltage up or moderating it down as necessary before allowing it to pass to the protected equipment. They are often used with enterprise network devices such as hubs and routers, small communications systems, servers and small workstation environments.

Online UPSs continuously condition incoming power to deliver clean, perfect sine wave power for protected equipment. Online UPSs completely isolate equipment from raw utility power and all its irregularities, and therefore represent the only logical choice for critical equipment that is sensitive to power fluctuations.

Advancements in computer chips and other components over the past decade have dramatically increased the capabilities of UPSs while reducing heat output and cost. Within any of these categories, systems can be configured for a broad range of output capacities, and multiple units can be deployed to accommodate loads up to megawatts. In this modular architecture, you can add or remove components, as needed. In fact, the system should be designed to permit individual modules to be taken offline for maintenance without removing the load from conditioned power.

Delivering confidence

Many organizations that rely on electronic systems are not fully aware of the potential for power problems until they happen - and then it's too late. From manufacturing systems to information systems, communication networks to physical transport networks, whatever the infrastructure in question, proactive planning and the right UPS can prevent the potentially devastating consequences of power disturbances.

Distributed Generation + Wind Power = ↓ Blackouts

Distributed Generation using Wind power can stabilize the Grid, prevent blackouts, decrease their spread, and shorten the duration of any disruption

PR Newswire ’03

[“Wind Power Can Help Prevent Next Blackout,” August 21, 2003, l/n]

As more than 50 million Americans and Canadians recover from the Blackout of 2003, conversations turn to the future and how to avoid this kind of disaster from happening again. At the Renewable Energy for Wyoming Conference beginning today in Douglas, Wyoming, discussions will undoubtedly focus on how wind power and other sustainable energy sources can play a larger role in the prevention of future catastrophic blackouts.

According to New York-based developer Arcadia Windpower, Ltd. and its Wyoming partner, HTH Wind Energy, Inc., a featured conference participant, wind power can help solve some of the problems that contributed to the blackout and can help reduce the likelihood of future blackouts.

"This first ever renewable energy conference in the state of Wyoming comes at a time of rising fossil fuel prices and concern about grid reliability. Wyoming Governor Dave Freudenthal deserves credit for his focus on renewables and their benefits to his state," said Dan Leach, CEO of HTH Wind Energy, Inc. "With 140 megawatts of wind electricity generators spinning, wind in Wyoming will stimulate economic development, help stabilize electricity prices, and provide fuel diversity in the state's generation mix."

According to Peter D. Mandelstam, founder and president of Arcadia Windpower, "Wind power, which is naturally clean, safe, and renewable, is also perfectly suited to strengthening the grid, which is what's important after a blackout like the one we had last week. Wind power needs to be part of the short-term solution and long-term reliability of the grid."

Grid stability can be achieved through distributed generation -- placing generating facilities throughout the region's grid so that when one section of the grid goes down, the distribution facilities are able to keep the rest of the grid in operation. Wind farms are particularly suitable for this strategy because they are scalable in nature and therefore can be sized according to local energy needs. Fossil fuel plants, on the other hand, can work only as large-scale power plants.

Additionally, wind farms, which can be plugged directly into a metropolitan area like New York City or a local pocket such as Long Island, can also ease transmission bottlenecks. The transmission bottlenecks north of New York City that likely contributed to the Blackout of 2003 could have been reduced had a wind farm in close proximity been in place and operating -- such as the off-shore project currently proposed for the south shore of Long Island.

"One of the most attractive features of wind power and off-shore wind, in particular, is the ability to site a plant close to where the electricity will be used," said Tom Gray, Deputy Executive Director of the American Wind Energy Association. "The recent blackout makes a compelling case for a wind plant off of Long Island that can deliver electricity directly to neighboring communities and the region."

Another benefit of wind power in a blackout situation is that as long as the grid is operating, a wind power facility can begin generating electricity almost immediately. In contrast, nuclear and fossil fuel plants must go through long restart and warm-up procedures of up to 48 hours. Time is also reduced in the development of wind power generating facilities, which can be built in just six to nine months. A conventional power plant generally cannot be completed from design to operation in less than two years.

About the Renewable Energy for Wyoming Conference

The Converse County Area New Development Organization (CANDO) is hosting a renewable energy conference Thursday and Friday August 21 and 22 at the Best Western Conference Center in Douglas. It is sponsored by the U.S. Department of Energy and the Wyoming Business Council, CANDO, and Arcadia HTH. The tentative speaker list includes David Garman, assistant secretary of Energy Efficiency and Renewable Energy, Wyoming Governor Dave Freudenthal, and representatives from several companies involved in wind and solar power.

Distributed Generation =↓ Blackouts and ↓ Micro-Disruptions

Distributed Generation can provide the stability and reliability to prevent big blackouts and minor events that damage the devices and the economy in general

Katz '04

[Alan, Senior Product Manager at MGE UPS Systems in California, *Electrical Consumption and Maintenance*, June 1, "Maintaining Facility Power in the Age of the Blackout," l/n]

The future of backup power

New technologies are on the horizon that promise everything from independence from the grid to smart ways to ride through long outages. Some hold promise while others seem to follow a never-ending horizon.

One of the most practical solutions isn't a breakthrough technology at all, but rather a smart practice called distributed generation. It consists of locating many small generating plants very close to demand areas. Typically, these generators are fired up to satisfy peak demand periods when the grid is most likely to be compromised.

Industry experts support this concept. In a recent Cap Gemini survey, 75% of the respondents said that distributed generation would have a positive effect in the next three to five years, "mitigating congestion costs and addressing system upgrade requirements for transmission."

Natural gas turbines, particularly high-efficiency co-generation systems, are expected to fill much of the void. Featuring a relatively low profile and low emissions, the co-generation plants don't require as much lead time and regulatory red tape associated with larger generating stations. However, that's not to say that a few nuclear power stations aren't on the horizon.

In many cases, energy consumers elect to use co-generation systems as a cost effective and reliable source of prime power backed up by the utility.

Distributed Generation ↓ Blackouts

Distributed Generation Solves Blackouts. Small generation isolates outages and stops the spread of disruptions

Kent '03

[Phil, Guest Columnist and Author, The Augusta Chronicle (Georgia), August 24, "CAN YOU IMAGINE THAT WE HAVE ELECTRIC RELIABILITY?" l/n]

Smaller system operators -- such as those we see in the traditional vertically-integrated utilities that served this country so well -- are preferred. This helps isolate outages to smaller pockets of customers when systems overload. The recent cascading **blackout** stopped when neighboring utilities disconnected their tie lines from the affected utilities.

Distribution Generation ↓ Blackouts

Distributed Generation solves blackouts in two ways – back-up power and decentralization stops spread

Glauthier, President, Electricity Innovation Institute, '03

[T. J., President & CEO of the Electricity Innovation Institute (E2I), an affiliate of EPRI, the Electric Power Research Institute. With me today is Dejan Obajic, Director of Grid Reliability and Power Markets at EPRI, Federal News Service, September 25, PREPARED TESTIMONY, BEFORE THE HOUSE COMMITTEE ON SCIENCE, SUBJECT - "LIGHTING UP THE BLACKOUT: TECHNOLOGY UPGRADES TO AMERICA'S ELECTRICAL SYSTEM" l/n]

The fear is now that the blackout will reinforce calls to reregulate the electricity industry that have grown in the wake of the California crisis and the energy merchant scandals. "We shouldn't let this deepen the already wasteful debate over whether to retrench. Too much time has already been spent bickering about reregulating," said Craig Roach, with power industry consultants Boston Pacific.
Roach hopes the blackout will refocus the industry on serving the consumer. He sees several steps that need to be taken including making a final verdict on transmission investment rules.
More importantly though, Roach believes policymakers and planners need to reexamine the grid in order to modernize electricity flows to reflect wholesale power competition and help efforts for merchant transmission companies to begin constructing new transmission projects (NGW July 7,p10).
In the end though, Roach thinks the blackout will lead to a greater examination of decentralizing the power grid through such distributed generation technologies as fuel cells and microturbines. Not only could they serve as back-up systems in case of transmission failure but also decentralization would minimize the impacts of failures on other parts of grid spreading across wide areas.
"If you add up the costs of today and yesterday, the lost wages, the hassles, it's not something a country like this should suffer," he said.

Distributed Generation ↓ Blackouts

Distributed Generation Solves Blackouts by reducing Transmission Bottlenecks and Demand on the Grid

The Economist '01
[“How to Keep the Fans Turning,” July 21, download date: 9-12-04, found at http://www.powertothepeople.org/newswire/article7.shtml]

An explosive new report by the General Accounting Office, a federal watchdog agency, also suggests that the FERC has been negligent. The agency will now work to develop a new test of market power that may not allow suppliers to earn market rates in regional markets (like California) that it decides are dysfunctional in other words, non-competitive. A reflective Mr H bert says his agency has learned from this crisis: Looking in the rear-view mirror, we should have jumped in quicker with California.

The next weak link in the power-deregulation chain is transmission and distribution. Officials in California reformed the wholesale and retail power markets, but neglected the grid. As wholesale trading has expanded, bottlenecks have built up in various places. One example is Path 15, the chief grid connection linking the northern half of the state with the southern half. Black-outs have sometimes occurred simply because power has been choked off.

Mr Davis has come up with a blunt answer: he wants the state to control the grid. Stephen Baum, the boss of Sempra Energy (which controls SDG&E), thinks this is a sound plan. But the better way would be for regulators to consolidate America's balkanised grid into just a few independent, regional operators, and then to give them strong incentives to upgrade the system. In this, too, California seems to have had a positive effect. On July 11th, the FERC boldly ordered just such a consolidation.

An even better way to get round bottlenecks is to expand distributed generation, or micropower. By placing small units close to the end-user, utilities (or end-users) need not in the first place send so much power down those ageing lines.

In the past, utilities sometimes used high standby charges or bogus safety worries to obstruct micropower. No longer, insists the energy tsar. The state recently decreed that all standby charges are to be waived for the next two years for micropower units. The utilities in the state are no longer capable of resisting, Mr Freeman insists. They are broke! And the people simply lack confidence in the grid's reliability.

Thanks to those pricey long-term contracts, the economics of micropower look better than ever. Micropower technologies, ranging from fuel cells to microturbines to small natural-gas plants, are taking off. Mark Bernstein of the Rand Corporation, a think-tank, says firms are now taking even solar power seriously.

<u>Net Metering ↓ Blackouts</u>

Net Metering solves blackouts - causes a shift to small-scale local renewable energy and decreases need for regular centralized generation

Brennan, Economics Professor, Maryland, '02

[Timothy J., Professor of Policy Sciences and Economics, University of Maryland, Baltimore Country, and a senior fellow at Resources for the Future (RFF); Karen L. Palmer is a senior fellow at RFF; Salvador Martinez is a Ph.D. student in Economics at U. of Florida. *Alternating Currents: Electricity Markets and Public Policy*, Washington DC: Resources for the Future, page(s) 182-183]

Another policy to promote renewables is net metering. Net metering is the practice of allowing customers with small generating facilities that are interconnected with the local distribution company to install meters that run backward during periods when their generation is in excess of their demand. Net metering allows a customer to use her excess generation during one part of the billing period to offset her consumption during another part. If the customer generates more than she consumes in total during the billing period, then that excess generation is usually purchased by the distribution utility or the electricity retailer. In some states, net metering programs are limited to renewables, although other states also include small combined heat and power facilities and fuel cells in their net metering programs. This provision creates an incentive for electricity consumers to install small-scale on-site renewable generation, thereby reducing the need for generation from conventional sources.

ANSWERS: No Blackouts in SQ

___. No risk of Blackouts: FERC reforms have solved in SQ

Wood, Chair of FERC, '04

[Pat Wood III, *The Hill*, June 17, p. 20, HEADLINE: Dependable energy key to strength of economy, l/n]

Temperatures are rising across the country as we enter the summer. With the warmer weather comes peak demand for electricity in most states.
In the months since the Aug. 14 regional blackout, the Federal Energy Regulatory Commission (FERC) and the electric industry have redoubled efforts to ensure that lights and air conditioners stay on as we enter the summer peak-demand season. But those efforts pale in comparison to the benefits the nation's electricity customers will derive from passage of the energy bill with mandatory grid-reliability legislation.
FERC was an active participant in the joint U.S.-Canadian task force that investigated last year's blackout. FERC moved quickly to implement the report's recommendations to the extent we could under existing statutory authority.
All transmission-operating utilities were required to report on tree-trimming and maintenance of transmission-line corridors, the results of which the commission will soon report to Congress. FERC also issued a policy statement affirming that adherence with North American Electric Reliability Council (NERC) standards is part of "good utility practice" required as part of FERC-approved transmission tariffs.
FERC engineers are participating with NERC teams as they work to conduct 23 reliability-readiness reviews by the end of this month -- encompassing transmission systems serving 80 percent of U.S. electricity demand. And FERC is monitoring carefully as NERC undertakes a reform of its standards to make reliability expectations and compliance clear and unambiguous.
All of those steps should go a long way toward insuring against a repeat of last year's blackout.

Answer: Grid OK in SQ

NO BLACKOUTS Coming in Status Quo. Grid is balanced and reliable, improvements to infrastructure have been made

Anderson '04

[Hil, "Analysis: Economy can warp power forecasts," United Press International, May 12, l/n]

The growth of the U.S. economy could be pegged as a wild card along with the weather in the latest forecast for North America's electricity supply during the coming summer months.

The North America Electricity Reliability Council (NERC) said Wednesday that supply and demand on the often times volatile power grid were expected to be in balance this summer, predictions that were based on assumptions of relatively "normal" conditions that did not include extended heat waves, major power plant breakdowns or a surge in economic growth that could result in a sharp increase in electricity demand.

But because an increase in energy use generally accompanies an increase in economic activity, there is the risk that demand forecasts used by utilities to plan for their supply needs could be outlandishly outdated before they are even put into effect.

"If there is a lag in timing between when the (demand) forecasts were done using the then-current economic forecasts, then it could change," NERC Sr. Vice President Dave Nevius conceded Wednesday during a conference call with energy writers.

Current estimates from the U.S. Energy Information Administration predict that the growth of electricity demand in the United States will continue at a fairly steady 1.5-percent rate through next year as the economy expands.

NERC said Wednesday that generation and transmission capacity would be capable of meeting demand this summer, although the organization, which oversees the reliability of the grid in the United States, Canada, and a sliver of northern Mexico, added its usual Cassandra caveat about the potential for heat and mechanical breakdowns creating periodic and largely localized supply shortages.

"NERC and the industry have taken a number of key steps to improve reliability in the wake of last summer's blackout," noted NERC President Michehl R. Gent. "If all entities (utilities) comply with NERC reliability standards, then there should be no uncontrolled blackouts."

No Link: Renewables

No Link: Renewables are reliable sources

Lovins and Sheikh, Rocky Mountain Institute, '08

[AMORY B. LOVINS, Cofounder, Chairman, and Chief Scientist of Rocky Mountain Institute (www.rmi.org) and has published in 29 books and hundreds of papers, his work has been recognized by a MacArthur Fellowship (1993). He has consulted for more than three decades for major firms and governments (including the U.S. Departments of Energy and Defense) on advanced energy and resource efficiency in ~50 countries, has advised scores of electric utilities and has led the technical redesign of >$30 billion worth of facilities. IMRAN SHEIKH, RMI Research Analyst, is now a graduate student at the Energy and Resources Group of the University of California at Berkeley. "The Nuclear Illusion," 27 May 2008, DRAFT subject to further peer review/editing, http://www.rmi.org/images/PDFs/Energy/E08-01_AmbioNuclIllusion.pdf download date: 6-21-08]

Unlike some important sources of distributed renewable power—such as small hydro, geothermal, biofueled, and even much solar-thermal-electric generation—that can be dispatched whenever desired, windpower (and smaller but even faster-growing photovoltaics) do produce varying output depending on the weather. Yet this variability, often assumed to pose a fatal obstacle, becomes far less important in a renewable energy supply system using diverse technologies, because weather that's bad for one source is good for another: stormy weather is generally good for windpower and hydro but bad for solar, while fine weather does the opposite. Diversifying locations helps too, because weather varies over areas that are often smaller than power grids. Technical reliability of single generating units is not the issue: modern wind turbines are ~98–99% available, far better than any thermal plant. The issue is rather the aggregate effect of some renewables' variability. As we'll now see, that effect is small.

The United Kingdom has 2.6% the land area, 7.7% the 2005 grid capacity, and 9.9% the 2005 electricity usage of the United States. A 34-year, >15-million-site-hour analysis of UK wind data found excellent properties for reliable windpower83 and even better ones for its contributions to diversified renewable power supply. A review of more than 180 European analyses through 2005 confirmed that windpower's variability even at penetrations of at least 20% for Europe, ~14% for Germany, or 30% for West Denmark are manageable at modest cost if renewables are properly dispersed, diversified, forecasted, and integrated with the existing grid and with demand response. Not one of more than 200 international studies has found significant costs or technical barriers to reliably integrating large variable renewable supplies into the grid. U.S. utilities increasingly agree: Lawrence Berkeley National Laboratory (LBL-58450) notes that 2014 resource plans include 20% wind for SDG&E and 15% for Nevada Power—neither near a limiting value. Nine recent U.S. studies found that integrating windpower providing up to 31% of regional peak demand on Western utilities' grids would incur firming and integration costs of 0.04–0.5¢/kWh,90 or ~1–15% of U.S. windpower's 3.7¢/kWh 1999–2006 average price—far too little to disturb windpower's two- to threefold cost advantage over new nuclear.

No Link: Renewables

No Link: Easy to integrate Renewables with the grid

Lovins and Sheikh, Rocky Mountain Institute, '08

[AMORY B. LOVINS, Cofounder, Chairman, and Chief Scientist of Rocky Mountain Institute (www.rmi.org) and has published in 29 books and hundreds of papers, his work has been recognized by a MacArthur Fellowship (1993). He has consulted for more than three decades for major firms and governments (including the U.S. Departments of Energy and Defense) on advanced energy and resource efficiency in ~50 countries, has advised scores of electric utilities and has led the technical redesign of >$30 billion worth of facilities. IMRAN SHEIKH, RMI Research Analyst, is now a graduate student at the Energy and Resources Group of the University of California at Berkeley. "The Nuclear Illusion," 27 May 2008, DRAFT subject to further peer review/editing, http://www.rmi.org/images/PDFs/Energy/E08-01_AmbioNuclIlusion.pdf download date: 6-21-08]

Some renewables' variability does require attention and proper engineering, but it's neither a serious issue nor unique to renewables: the grid is already designed for the sudden and unexpected loss of big blocks of capacity from transmission or central-plant outages. Whenever renewable penetration levels of supposed concern have been approached in practice, they've faded over the hazy theoretical horizon. For example, as the West Danish system operator gained experience with windpower, he became confidently able to manage nearly five times more windpower than he had thought possible 7–8 years earlier. This horizon also continues to recede as distributed intelligence gradually permeates the grid and as more diversified combinations of resources are simulated. Recent University of Kassel field experiments have confirmed that just integrated wind, photovoltaics, and biogas generation could reliably provide all German electricity. The north German state of Schleswig-Holstein, which got 39% of its 2007 electricity from windpower, now aims for 100% by 2020, as it already achieves in windy months.

No Link: Renewables

The grid will survive and Renewables do not increase strain on the grid.

Lovins and Sheikh, Rocky Mountain Institute, '08

[AMORY B. LOVINS, Cofounder, Chairman, and Chief Scientist of Rocky Mountain Institute (www.rmi.org) and has published in 29 books and hundreds of papers, his work has been recognized by a MacArthur Fellowship (1993). He has consulted for more than three decades for major firms and governments (including the U.S. Departments of Energy and Defense) on advanced energy and resource efficiency in ~50 countries, has advised scores of electric utilities and has led the technical redesign of >$30 billion worth of facilities. IMRAN SHEIKH, RMI Research Analyst, is now a graduate student at the Energy and Resources Group of the University of California at Berkeley. "The Nuclear Illusion," 27 May 2008, DRAFT subject to further peer review/editing, http://www.rmi.org/images/PDFs/Energy/E08-01_AmbioNuclIlusion.pdf download date: 6-21-08]

The grid is designed to cope, and does cope, with such massive and prolonged central station outages, albeit with difficulty and at considerable cost for reserve margin, spinning reserve (spare capacity—generally coal-fired—kept running and synchronized for instant use), and replacement energy. The investments needed to manage central-thermal-plant intermittence (nuclear or fossil-fueled) have already been made and paid for. It is therefore hard to understand why the occasional and predictable becalming of wind farms or clouding of solar cells over a much smaller time and space, offset by higher output from statistically complementary renewable resources of other kinds or in other locations, is a problem. All generators—not just variable renewables—need reserves, backups, or storage to achieve a given level of reliability. It's wrong to count these as a cost for variable renewables but not for intermittent thermal plants. Every source's economics should duly reflect the amount of support they require for the desired reliability of retail service.

ANSWERS: Operators Solve Blackouts

Operators Solve Blackouts, Anticipate Local Failures

Makovich, Cambridge Energy Research Associates, '03

[Larry, Senior Director of Americas Research at CERA, Capital Hill Hearing Testimony, FDCH, Committee: House Energy and Commerce, Headline: Power Blackouts, September 4, lexis/nexis]

Such unplanned power plant outages occur thousands of times each year and so too does the instantaneous rerouting of power flows. Such normal component failures and dynamic power flows are part of normal power system operations.
Transmission system operators plan for normal component failures. To do this, they configure the electrical system-the real-time balancing of sources of power and uses of power and the limits on transmission line loadings in the system to withstand the effects of normal component failures. At a minimum, proper transmission network planning keeps the power system configured in such a way that it can withstand the effect of the most critical component in the system failing (first contingency planning). Automatic controls on generating plants and transmission lines allow the power system to isolate problems, protect equipment, and reconfigure itself to a stable condition within seconds following a normal component failure.

ANSWER: Smart Grids solve Blackouts

New 'Smart' Grids are reliable, prevent blackouts

Center for American Progress '08

[The Center for American Progress is a think tank dedicated to improving the lives of Americans through ideas and action. "It's Easy Being Green: The Next Generation of Electricity?" http://www.americanprogress.org/issues/2008/06/smart_grids.html download date: 6-21-08]

Two recent developments signal that electrical grids in the United States may soon receive a much-needed upgrade: Xcel Energy's announcement earlier this year that it would make Boulder, CO, the nation's first fully integrated smart grid city, and Title XIII of the Energy Independence and Security Act of 2007, which authorizes a large-scale demonstration program for smart grids.
The smart grid, though still in its infancy stages, offers enormous potential in improving energy distribution and delivering greater efficiency in energy use. The idea is to integrate digital, high-speed communications technologies with the electric grid that would allow for real-time, two-way communication between the utility and the consumer throughout the distribution grid.
The result is a system where consumers can have programmable devices installed in their homes, allowing them to control home energy use, monitor electricity costs, communicate directly with the utility company, and even choose the source of their electricity. The grids themselves would have such capabilities as the ability to "self-heal," diverting power automatically if a transformer or line goes down. This would ensure that all areas of the grid are always provided with uninterrupted service, preventing blackouts. Real-time information from the system would also allow grid operators to isolate affected areas and redirect power around damaged facilities.
Benefits of the smart grid system would include greater consumer choice over energy source, more reliable grids when problems arise, potential reduction in power consumption, and greater use of renewable, clean energy sources, with the potential for consumer compensation for conserving or generating power.

No Blackouts in SQ
(A/T: Economic Growth → Blackouts)

Economic Growth will NOT crash the Grid. Supply will be adequate to meet demand

Anderson '04

[Hil, "Analysis: Economy can warp power forecasts," United Press International, May 12, l/n]

The ever-changing weather is always an "X factor" in forecasting power demand; however while rising temperatures lead to higher air-conditioning use, better economic times also voraciously gobble up more power as offices, stores and manufacturing plants remain open longer.
The Organization for Economic Cooperation and Development had mentioned on Tuesday that the U.S. economy was poised for a hefty growth of 4.7 percent this year.
And while the NERC report does not include a prediction of overall economic growth in its summer assessment, NERC officials said that individual reliability councils around the nation use their own regional economic estimates as they crunch the numbers for their regional demand projections.
"Those forecasts are done on a cyclical basis and in all probability haven't been re-done (to reflect) any new economic changes since April," Nevius said. "Some of these were done last fall -- and some were done last summer, so there is a mixed bag in reflecting any change in the economic situation as far as the load forecast."
"The timing and how long it takes to filter through and become part of the rolled-up forecast is always an issue," Nevius added.
Instances of demand increasing higher than anticipated due to better economic times are unlikely to produce outages on their own. NERC calculated that demand during peak periods of June would top out at nearly 729,000 megawatts (MW) while committed generating capacity is more than 954,000 MW.
Higher sustained demand, however, narrows the margin for error in the event a power plant breaks down or should a major transmission line become congested. In addition, the higher consumption would increase demand for fuel, particularly natural gas and coal, which could mean higher electric bills for consumers.

ANSWERS: Empirically Denied

___. Empirically Denied: Many huge blackouts in past decade but no big impact resulted

US Newswire '03
["IEEE-USA's Call for Reliability Legislation Underscored by Largest U.S. Power Outage," Aug 15, l/n]

Electric power reliability problems have led to more blackouts in recent years than historically experienced in North America. Customers in 14 western states underwent scattered outages twice in the summer of 1996. Major outages occurred during the summer of 1999 in different regions of North America, including Chicago and New York. More recently, California experienced rotating blackouts, price spikes and near bankruptcy of several utilities starting in mid-2000 and continuing into 2001.

A/T to States CP: States CANNOT Solve Grid Reliability

States cannot effectively regulate inter-state grid issues

Wood, FERC Chairperson, '03

[Patrick, September 3, FDCH Congressional Testimony, COMMITTEE: HOUSE ENERGY AND COMMERCE, HEADLINE: POWER BLACKOUTS, BILL-NO: H.R. 6, l/n]

In 1965, President Johnson directed FERC's predecessor, the Federal Power Commission (FPC), to investigate and report on the Northeast power failure. In its report, the FPC stated:

When the Federal Power Act was passed in 1935, no specific provision was made for jurisdiction over reliability of service for bulk power supply from interstate grids, the focus of the Act being rather on accounting and rate regulation. Presumably the reason was that service reliability was regarded as a problem for the states. Insofar as service by distribution systems is concerned this is still valid, but the enormous development of interstate power networks in the last thirty years requires a reevaluation of the governmental responsibility for continuity of the service supplied by them, since it is impossible for a single state effectively to regulate the service from an interstate pool or grid.

Northeast Power Failure, A Report to the President by the Federal Power Commission, p. 45 (Dec. 6, 1965).

In response to the 1965 power failure, the industry formed NERC. NERC is a voluntary membership organization that sets rules primarily for transmission security in the lower 48 states, almost all of southern Canada, and the northern part of the Baja peninsula in Mexico. More detailed rules are prescribed by ten regional reliability councils, which are affiliated with NERC. However, neither NERC nor the ten regional reliability councils have the ability to enforce these rules. And these rules are administered on a day-to-day basis at over 130 utility control areas.

IV. Next steps

Regardless of the actual cause of this blackout, the event, like earlier blackouts, has demonstrated that our electrical system operates regionally, without regard to political borders. Electrical problems that start in one state (or country) can profoundly affect people elsewhere. Preventing region-wide disruptions of electrical service requires regional coordination and planning, as to both the system's day-to-day operation and its longer-term infrastructure needs.

Currently, the Congress has before it, in conference, energy legislation which could address a number of issues that have arisen in the debate in the last few weeks over reliability in our wholesale power markets.

First, both the House and Senate bills going to conference provide for mandatory reliability rules established and enforced by a reliability organization subject to Commission oversight. Many observers, including NERC and most of the industry itself, have concluded that a system of mandatory reliability rules is needed to maintain the security of our Nation's transmission system. I agree.

COUNTERPLAN Solvency – Utility Consolidation

Creation of a comprehensive regulatory environment supportive of utility consolidation would spur mergers and cost savings. This would result in upgrades to the Grid, preventing Blackouts

Bilicic and Connor '04

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The recent Northeast Blackout framed for regulators and public policy-makers one of the central issues confronting the utility industry: infrastructure reliability and the significant capital investment requirements necessary for improvement. While estimates vary widely, some industry experts currently project that the investment necessary to revitalize and secure the transmission infrastructure in the United States may run in excess of $ 100 billion. The challenge for policy-makers in addressing these significant investment needs will be to create a sustainable economic and regulatory regime that is supportive of infrastructure investment while not unduly burdening either utilities or ratepayers.
The challenge is made more complex when one takes into account the already existing pressures on rates, especially from natural gas prices. Moreover, many utilities have not realized rate increases for some time, with current rate levels also frequently funded by cost savings strategies that are not sustainable over the long term.
The good news is that a solution is readily available that would properly balance these structural and economic imperatives: create a comprehensive regulatory environment supportive of utility consolidation that directs a significant portion of the derived merger synergies toward infrastructure investment.
The North American utility industry remains highly fragmented, in part as a consequence of a regulatory environment that is adverse to consolidation. For example, current state regulatory practices typically result in 50 percent or more of merger-related cost savings being passed on to ratepayers in the form of rate cuts. This inability to capture the economic benefits of mergers, coupled with onerous and extraordinarily time-consuming regulatory approval processes, has significantly impeded merger activity in the industry. As a result, the consolidation that occurred in most industries over the past two decades, and that resulted in significant respective economies of scale, largely bypassed the utility industry.
Utility mergers create exceptional efficiencies, yielding average cost savings of approximately 5 to 10 percent of the combined company's non-fuel operating expenses. These substantial untapped cost efficiencies could be harvested through more merger-friendly state regulatory policies that would enable utilities to retain these merger cost savings so long as a significant portion was channeled toward infrastructure investment. Provided that utilities would be allowed to earn timely, economic returns on such investments, this would provide a powerful inducement for consolidation and generate enormous investment capital. For example, if 50 percent of merger synergies were directed to investment in the U.S. electricity system and the top 100 utilities merged to create only 50, it could result in as much as $ 50 billion in derived cost efficiencies being allocated toward electricity system investment.
As a result of the earnings-growth challenges facing the industry (*see Figure 1*) at a time of historically high trading multiples (*see Figure 2*) and significant exposure to interest rate increases (*see Figure 3*), the utility industry could be quite inclined to pursue consolidation, assuming reasonable regulatory support exists. Consolidation remains a viable means to generate earnings growth and value, as compared with other methods that have been pursued in the past (*e.g.,* international, non-utility businesses, large merchant plays) and would be severely scrutinized in today's marketplace.
Comprehensive regulatory policies supportive of consolidation in the utility industry would benefit all constituencies. Regulators would be able to achieve significant reliability investment while avoiding, or at least significantly mitigating, the politically unpalatable proposition of increasing rates. The utility industry (and its shareholders) would materially benefit by eliminating currently embedded cost inefficiencies, realizing economies of scale and generally becoming financially stronger. And ratepayers would avoid shouldering the entire burden of infrastructure investment in addition to other rate pressures described above.
Currently, however, and notwithstanding the compelling economic proposition outlined above, it is uncertain whether the overall regulatory will exists to properly align the industry's economic policies with the need for significant industry investment. While there are features of the proposed federal energy legislation that would ease the administrative burdens of seeking consolidation approvals, much more still must be done on the regulatory front. What is certain is that, in the absence of the necessary economic incentives, utilities will continue to find new investment in transmission and other system infrastructure challenging, thereby impoverishing the U.S. power system and ultimately degrading reliability over time. While the causes of the Northeast Blackout will be considered for some time, the *debate* about the causes of the blackout reminds us that the price for the continued neglect of the U.S.'s electricity infrastructure needs is very steep and very real.
Investment in infrastructure, however, requires that a fair return be available that someone--*i.e.,* ratepayers--must fund. In an economic and general rate environment with many pressures that will otherwise require rate increases, additional rate increases to fund investment may be politically challenging albeit necessary. Having access to the embedded economies of scale from industry consolidation could ease these burdens and create benefits through further system reliability and investment.

Counterplan Solvency – Back-Up Diesel Generators

Back-Up Diesel Generators solve the effects of Grid Failure, including economic damage and failure of critical facilities

PR Newswire, '04

[SECTION: WASHINGTON DATELINE; HEADLINE: One Year and 10 Seconds Later: Northeast Blackout Anniversary Offers Reminder of Importance of Emergency Backup Power; Essential Tips on How Businesses Can Avoid Losses During a Power Outage; SOURCE Diesel Technology Forum. August 10, Lexis-Nexis]

Businesses can mitigate the economic risk of power outages by ensuring power reliability is a part of their business plan. A key component of this reliability is the installation of diesel-powered emergency backup generators. Diesel standby generators uniquely start automatically within 10 seconds of a power outage, helping protect critical data, security and communications systems. "No other power source offers the combination of quick start-up time, reliability and load carrying capacity of diesel-powered generators," commented Schaeffer. Within seconds of the Northeast blackout, diesel standby generators were up and running, providing a reliable and safe source of power for critical systems such as airports, hospitals, 911 emergency response, financial markets, nuclear power plants, drinking water treatment systems, the national news networks, and even the Statue of Liberty.