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Is it Time to Cut the Ties that Bind?

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By George C. Loehr, eLucem

In the wake of the August 14 blackout, everyone says we need more transmission — from the liberal *New York Times* to the conservative *Wall Street Journal*, from the Federal Energy Regulatory Commission (FERC) to North American Electric Reliability Council (NERC). Whenever there's that much unanimity, I get a little nervous. But, if our goal is to prevent blackouts, we don't need more transmission, we need more stringent standards. Maybe we also need to “cut the ties that bind” and to break the present grids into smaller synchronous interconnections tied together with high-voltage direct current (HVDC).

We've managed to confuse reliability with the robustness of the grid to accommodate large power transfers. They are two entirely different issues. It seems intuitive that a strong system will be more reliable. Not so. In actuality, a weak interconnection with stringent standards will be more reliable than a strong interconnection with weak standards. Think about it. If only a few weak tie lines were to connect two major systems, but that interface was always operated within stringent reliability criteria, a cascading blackout would be highly unlikely.

Reliability is a function of the reliability standards (or criteria) used, not the amount of wire in the air.

New Transmission Alone Will Not Improve Reliability

In fact, it might actually make the system less reliable, because adding transmission makes the bulk power system electrically tighter, geo-electrically smaller. Thus, a severe disturbance is likely to cause a blackout in a much larger area. If we add massive amounts of transmission but use the same or less stringent criteria, the next time a major disturbance occurs, it could take down an even larger area, maybe the entire Eastern Interconnection.

Former Secretary of Energy Bill Richardson characterized the present interconnections in North America as a “Third World Grid,” and President Bush called it “inadequate.” Such uninformed comments are insulting to those who planned, built and operate the system. The truth is just the opposite. If we did have a Third World grid, we wouldn't have a grid at all. The problem is the Eastern and Western Interconnections in North America have become too large, too tightly integrated and too interdependent to operate reliably in the “brave new world” of deregulation and restructuring. The 600-GW Eastern Interconnection stretches from the Atlantic Ocean to Colorado, from northern Manitoba to the Gulf of Mexico. It's home to thousands of transmission owners,

generating companies, power marketers and electric service providers, not to mention sometime-overlapping regional transmission organizations (RTOs) and more than 100 control areas. In a system that huge, every constituent part will be vulnerable to disturbances anywhere else on the system. This interdependency is growing, and it's being exacerbated by a steady flow of new regulations and procedures from FERC and NERC.

Strong Criteria are a Basic Form of Consumer Protection

Right now, NERC is proposing to revise a set of criteria (Standard 600) to make it significantly less stringent than it is today. In brief, the proposed changes would do away with all contingencies that involve more than a single system element. Thus, long-established contingencies like loss of both circuits of a double-circuit tower line, a fault with a stuck breaker, or loss of both poles of a bipolar dc line would be dropped. This would constitute a serious degradation in bulk power system reliability.

At the same time, serious consideration is being given to changing from the present concept of NERC criteria as minimum standards, to a concept of NERC standards as absolute, one-size-fits-all — ceiling as well as floor. If this change is permitted, no state, ISO, RTO, regional reliability council or other reliability organization will be allowed to institute stronger criteria. Don't expect help from Washington. Despite the attempts of some members of Congress, the wording in the failed Energy Bill was ambiguous on this issue.

As a power system reliability expert with more than 40 years of experience, I consider it critical that any state or reliability entity be able to use at least the same level of criteria that it has in the past. Therefore, I strongly recommend the following principles:

- NERC criteria are minimum criteria; any entity may have more stringent criteria.
- Any entity with more stringent criteria should not be required to obtain approval from NERC.

Cut the Ties that Bind

One area to which I've given a lot of consideration is the ultimate size and shape of the grid. I believe the two large North American grids should be broken into a series of smaller ones and tied together, not with today's ac transmission lines, but with dc lines. I catch a lot of flack on this idea, but no one has been able to refute the logic. And in the grand scheme of things, it is not an outrageously expensive solution.

We know that with ac, what happens in one place on the grid affects everywhere else. So a contingency in Ohio is felt as far away as the Maritime Provinces. This doesn't happen with dc. That is because dc ties would insulate each smaller grid from all the others. Major disturbances would be contained.

Nor would smaller grids just substitute local or regional markets for the single larger market embraced by economists (and pro-deregulationists). Power could still be exchanged over the dc ties. In fact, it could be controlled completely, something impossible with ac. Markets would function more efficiently and more transparently. Existing ac lines could even be used, without modification; the electric conductors don't care if they're carrying ac or dc. In fact, the system would actually operate the way economists think it does.

With converters costing about US\$100,000/MW, we could break the Eastern and Western

Interconnections into a series of smaller grids, with dc ties matching or equaling today's transfer capabilities, for less than \$10 billion. Compared to the \$50 to \$100 billion I've heard bandied about, that may be a bargain. Blackouts have a cost, too. August 14th has been pegged at \$6 billion.

The August 14th blackout has the nation's attention. We have the expertise to take the steps necessary to assure a robust and secure grid. But do we have the will? Does the nation have the determination to stop marginalizing the experts and listen to them instead of to vested interests? It's time to come together. Let's build a system and standards that will work for all of us.

George C. Loehr began his engineering career in transmission planning with the Consolidated Edison Company of New York in 1962. Following the 1965 Northeast Blackout, he chaired the committee to perform the first computer simulation of that event. Loehr joined the New York Power Authority as chief planning engineer in 1969, and the Northeast Power Coordinating Council (NPCC) in 1972. Loehr was active in NERC, serving on several committees, sub-committees and task forces. He was executive director of NPCC from 1989 through 1997. Loehr now performs management consulting, serves as an expert witness and teaches courses on power systems. Loehr is an "unaffiliated member" of the Executive Committee of the New York State Reliability Council, and chairs the Reliability Compliance Monitoring Subcommittee.

gloehr@eLucem.com

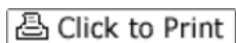
Editor's Note: For those who would like to make their voice counted, consider supporting the advocacy group, Power Engineers Supporting Truth (PEST). George Loehr, a founding member of this group of seasoned engineers, is committed to uncovering the truth about the August 14th blackout.

Although an investigation presently is underway, it has been carefully orchestrated to eliminate any discussion of the effects of restructuring legislation, and it has not addressed the industry's change in focus from long-range reliability to short-term profits.

PEST is calling for Congress or the President to appoint an Independent Investigative Board made of recognized technical experts to provide a thorough technical analysis of the grid and to recommend engineering-based solutions to secure our national resource.

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