

Transmission - The need for new rules and advanced technology

The massive power outage that struck the US and Canada on August 14, 2003 should never have happened or, at a minimum, should have been contained to a much smaller area. Why it was not and what can be done to prevent similar events are the obvious questions. This paper outlines our perspective as a technology provider to the nation's transmission and distribution infrastructure.



Information released by the North American Electric Reliability Council (NERC) points to cascading transmission line failures as the cause of the electrical blackout. While it may take weeks before analysis of all the data is complete and the root causes for the failure have been identified, it is well known that investment in the nation's transmission system has slowed down significantly over the last twenty years and the power system has often been pushed to its limit while delivering the energy needs of a growing economy.

We make the following observations regarding the transmission and distribution grid:

- ❑ **Investment in the transmission grid has not kept up with the growth in demand and increase in energy trading.** According to the Edison Electric Institute (EEI), transmission investment has dropped from \$5 billion in 1975 to \$2 billion in 2000 (in 1997 dollars).
- ❑ **Significant levels of investment are needed in the nation's transmission and distribution grid.** Estimates for the investments required to restore the needed integrity to the grid are more than double today's spending levels.
- ❑ **Regulatory uncertainty has delayed and provided a disincentive for investments in the grid.** Neither the FERC's 2000 NOPR, SMD proposal nor the latest Wholesale Market Platform (WMP) establishes a clear mechanism for how transmission upgrades can be recovered by regulated or merchant transmission companies. The overlapping jurisdiction of FERC, state PUCs and RTOs on issues of regional coordination has caused tremendous hurdles to be placed in the path of any transmission upgrade project.

- **Transmission issues are inter-regional.** Transmission is an inter-connected entity and cannot be looked at within state or regional boundaries. The three main grid systems in the US and Canada are the Eastern Interconnection, Western Interconnection and the Texas system.

Based on the observations above, ABB in our role as a premier technology provider to the nation's transmission and distribution infrastructure, would offer the following recommendations:

- **Establish clear rules for Transmission Upgrades.** In the ensuing dialogue between Federal, State and Regional authorities we urge the parties to formulate a set of clear mechanisms whereby regulated as well as merchant entities can and will invest in transmission upgrades. Give special incentives to solutions that offer fast implementation and increase the robustness of the transmission grid, e.g. those that improve voltage stability and provide "black start" capability.
- **Strengthen NERC's role in setting and enforcing operating and reliability guidelines.** NERC was created after the 1965 blackout. The structure of the energy industry has become significantly more complicated since then. The powers and responsibilities of NERC must be strengthened to ensure reliability in today's complex energy markets.
- **Apply new technologies to improve the performance of the nation's grid.** The performance and reliability of the nation's transmission grid can be enhanced speedily with the application of proven new technologies which have significantly lower environmental impact, have smaller footprints and are extremely flexible in their operation compared to conventional ways of upgrading the grid with overhead lines. Such proven technologies include:
 - **Real-Time Wide Area Monitoring and Control of Power Systems:** Advances in control technology now allow grid-wide monitoring and control of the power flows, transmission limit calculations and power plant operation. Advanced control systems, system protection, communication and automation applications can significantly improve the capacity and reliability of the existing system.
 - **HVDC Transmission:** High Voltage Direct Current power electronic systems allow power flow across regions without troublesome "loop flows" while providing support and performance enhancement for the surrounding AC (Alternating Current) Grid. HVDC links also have built-in overload control and can be loaded fully without increasing the risk for cascaded line tripping.



- **HVDC Light:** In addition to the benefits of traditional HVDC, this latest technology will offer enhanced voltage control and black start capability.
- **FACTS Devices:** These Flexible AC Transmission devices, such as Static VAR Compensators (SVC) and Series Capacitors, can enable more power to flow on existing power lines and also improve voltage stability. They make the system more resilient to “system swings” and disturbances. The most recent developments include devices with the same proven technology base and performance as HVDC Light.
- **GIS (Gas insulated substations) and underground cables.** Enhancements in conventional technologies have allowed large amounts of power to be transmitted and distributed in a compact and un-obtrusive way. Examples of such devices are gas-insulated substations, which can enhance the reliability of an urban network in a minimum of space.
- **Life Extension.** Modern materials and design analytics often allow manufacturers to economically upgrade the capacity of existing equipment, to improve its reliability and to increase its useful life.



400 kV, 320 MVAR SVC Installation

At ABB we believe that the US has the world's most complex and demanding power system. This system must keep up with increases in demand and the emergence of competitive power markets. The technology exists to bring the nation's grid up to the desired level of reliability and performance. We have the experts and tools to help get the most out of these technologies. We are able and willing to help any entity, government or private, in their quest to improve and enhance the nation's transmission and distribution system.

For more information on this position paper please call your local ABB representative or: **Randy Schrieber, VP Strategic Operations**, at (919) 831-3164 or by email at randy.r.schrieber@us.abb.com

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