Prepared for
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DRAFT Report on the State of West Virginia in the Regional Electricity Transmission Grid

West Virginia is positioned east of the center of what is termed The Eastern Interconnection. The electricity grid as thus defined distributes electricity via interconnected lines in 36 U.S. states and six Canadian provinces from Saskatchewan to Florida. The Eastern Interconnection covers 75 percent of U.S. peak electricity demand - 608,647 megawatts - and in 2004 had 132,290 miles of 230 kV or greater transmission lines.[1] The U.S. portion of the area includes 207 million people.

West Virginia is part of the ReliabilityFirst Corporation (RFC) reliability council which includes 13 states and the District of Columbia.[2] Until it was dissolved in 2006, the State had been a member of the smaller East Central Area Reliability Council (ECAR) region. RFC's member companies include approximately 20 providers of transmission services including American Electric Power (AEP) and Allegheny Energy (AE). The transmission systems of the RFC member companies are managed by the Pennsylvania-Jersey-Maryland (PJM) Interconnection, a regional transmission operator (RTO) that manages the flow of electricity through its territory. The PJM service area has a population of about 51 million and a peak demand of 144,644 megawatts, or about 24 percent of demand in the Eastern Interconnection.[3] West Virginia has an electric generation capacity of about 16,443 megawatts.[4]

It is professionally accepted that improving transmission capacity and upgrading facilities is needed and would in the aggregate be beneficial to customers in the Eastern Interconnection. General recommendations include expanding transmission capacity between the Midwest and the East Coast and Southeast, from the Southeast into Florida, and within the Southeast and southern Great Plains. Because of the interconnectedness of the grid, investments are frequently made far from customers who will receive the most benefits from that investment.

The calculation of transmission benefits is complicated by the definition of congestion on the grid being financial as well as physical. In part congestion is an issue of "economic dispatch" where low-cost generators, historically coal-fired, are unable to transmit their power into higher-cost markets because of congestion, forcing the regional transmission operator (RTO) to purchase higher-cost gas or oil-fired power.[5] It is very difficult to separate upgrades that are physically necessary to maintain system reliability from economic upgrades in terms of those who receive the benefits. In addition, because

[1] ftp://www.nerc.com/pub/sys/all_updl/docs/pubs/LTRA2005.pdf
[2] For a map of RFC see http://www.rfirst.org/MiscForms/AboutUs/Territory.aspx.
[3] http://www.pjm.com/about/territory-served.html.
[4] http://www.eia.doe.gov/fuelelectric.html
[5] The Energy Policy Act of 2005 defines "economic dispatch" as the operation of generation facilities to produce energy at the lowest cost to reliably serve customers, recognizing any operational limits of generation and transmission facilities. "Security constrained economic dispatch" has the same definition.

economic congestion costs will change as the relative prices of natural gas and coal change, that element of congestion is a moving measurement. Allocation of transmission benefits is important due to the need to recover facility costs from customers. Two quotes from Cambridge Energy Research Associates regarding various recommendations summarize the situation: "Net benefits to any particular stakeholder group cannot be guaranteed, which complicates the negotiation process that is generally necessary to unleash investment activity," and "Uncertainty regarding the true level and distribution of future gains and losses further obscures the identities of those that should pay for enhancements and those that deserve to be compensated." [6]

As described later in this memorandum most identified congestion, both physical and economic, is east and north of West Virginia and much of the benefit of enhanced transmission would be realized by markets in those areas. However, transmission lines in West Virginia also impact utility territories to the South and West. The last five years have resulted in a series of studies and events regarding the regional transmission system that have affected West Virginia and utilities that operate in the State. The more dominant events are summarized below, in chronological order.

REGIONAL EVENTS

Several Regional Transmission Systems Integrate as AEP, Allegheny and other Midwestern Utilities Join PJM in 2004

A Federal Energy Regulatory Commission (FERC) condition of American Electric Power's (AEP) 2000 merger Central & South West Corp. was AEP's entry into a FERC-approved RTO. AEP chose to join PJM and officially did so in 2004. Integration of AEP's transmission system impacted markets both east and west of its territory. For example, following the integration of AEP into PJM the NIPS (Northern Indiana Public Service) system "experienced a significant rise in congestion that was mitigated by including some NIPS demand constraints in the PJM dispatch."[7] This event illustrates the role of the system operator in controlling the flow of electricity in a region.

Regional Transmission Systems are Scrutinized Following the Blackouts of 2003

An investigation by ECAR's Major System Disturbance Analysis Task Force of the August 14, 2003 blackout determined that the North American Electric Reliability Council (NERC) operating policies had been violated and that several actions that could have prevented the blackouts were not taken. Four conclusions were identified. Two related conclusions deal with the two primary factors that contributed to the disturbance.

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[6] Peabody Energy memo to the U.S. DOE's Office of Fossil Energy (January 4, 2006) citing excerpts from the executive summary of Cambridge Energy Research Associates 2004 Study: "Grounded in Reality: Bottlenecks and Investment Needs of the North American Transmission System - Eastern Interconnection." http://fossil.energy.gov/epact/Section_1818/Peabody_Energy_Corp._1-04-06.pdf

[7] Cite the DOE Congestion Study.

Two separate conclusions deal with a secondary factor that contributed to the disturbance and the reason for the propagation of the disturbance. [8]

Primary factors that contributed to the disturbance were:
1. The lack of sufficient intervention by FirstEnergy to relieve line overloads.
2. The tripping (dropping out) of lines below their emergency ratings.
In reaching the above two conclusions, it was noted that the absence of either one of these two primary factors could have resulted in the avoidance of a disturbance.

Secondary factors that contributed to the disturbance were:
3. System conditions became worse (e.g., lower voltages and higher currents) than otherwise expected as outages began to take place due to a shortage of reactive resources in the initiating area of the disturbance.
4. The propagation of the disturbance beyond northeastern Ohio, and its geographical direction, was a direct result of the particular South-to-North and West-to-East flow pattern on the transmission system that day.

The ECAR investigation and review of an interim report of the joint U.S. – Canada Power System Outage Task Force resulted in 11 recommendations related to violations of NERC operating policies and specific actions that transmission owners and reliability coordinators should take to avoid future disruptions.

An ECAR Self-Assessment States that the Region Can Meet Internal Demand for Power through at least 2013

In 2005 NERC asked its member councils to perform self-assessments of demand for bulk power in their regions. The following quote from that report summarizes its conclusions for the former ECAR: "The bulk electric systems in ECAR are expected to perform well in meeting the forecast demand obligations over a wide range of anticipated system conditions, as long as established operating limits and procedures are followed and proposed projects are completed in a timely manner. AEP has started construction on its 765-kV transmission line in southeastern ECAR, which is expected in service in mid-2006 and is needed to guard against potential widespread interruptions. The region's criteria for resource adequacy will be satisfied through at least 2013, based on the assumption that capacity resources of up to 5,550 MW are available outside the ECAR region when needed, and that the average annual generating unit availability is maintained at or above levels experienced in recent years." [9]

The results of this assessment indicate that the former ECAR was, at the time, confident of the ability of existing transmission and generating resources to meet demand by West Virginia and other customers within its region through at least 2013.

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[8] http://www.ecar.org/News/MSDATF%20Black%20Out%20Report%20-%20Recommendations.pdf
[9] ftp://www.nerc.com/pub/sys/all_updl/docs/pubs/LTRA2005.pdf

A U.S. DOE-Contracted Congestion Study Summarizes the Status of Regional and Interregional Congestion Issues Identified by System Operators and Reliability Councils and DOE Designates National Interest Electric Transmission Corridors

As reported in its Executive Summary, this study concluded that the area from Washington, DC up to around Utica, NY is a "critical congestion area."[10] [11] All the general congestion problems identified in the Eastern Connection are between Washington, DC and New England. Problems are related to aging transmission infrastructure, generating plant retirements, population growth and reliance on oil and gas. Specific comments regarding the area include:

- "Accordingly, New Yorkers would benefit from improved access to low-cost power."
- "PJM finds that without transmission upgrades, critically important loads in the Washington, DC – Baltimore area will face numerous violations of reliability criteria over the next 15 years."
- "Few efficient new power plants have been built close to the load centers in the past decade."

The full DOE report includes an hourly simulation for a year of transactions between system operators in the Eastern Interconnection.[12] The study authors identified key end markets and defined transmission corridors as pairs of connected end markets. Several iterations of the simulation were conducted that included various prices for natural gas and coal. The report also mentions several other interregional transmission studies that were not made public, including the one done by Cambridge Energy Research Associates.

Included within the broader Mid-Atlantic Area National Corridor are 42 of West Virginia's counties. The corridor designation is stated to be effective from October 2007 to 2019.

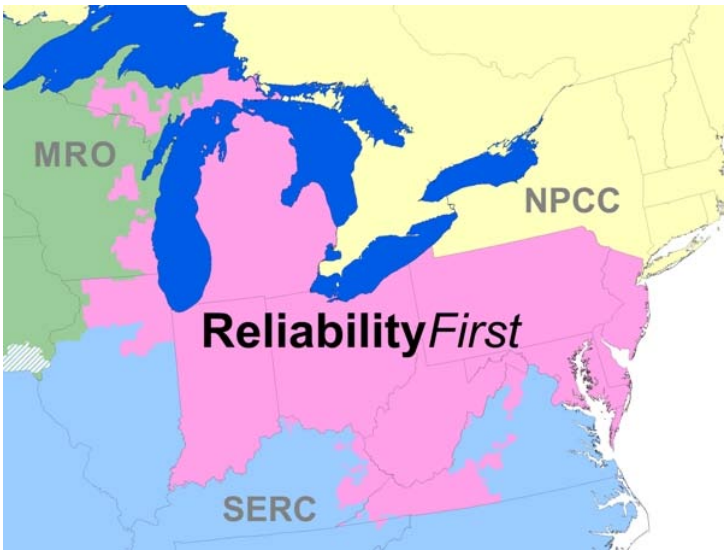
The Regional Reliability Council that Includes West Virginia is Enlarged and Restructured

ReliabilityFirst Corporation (RFC) began operations on January 1, 2006. RFC replaced four reliability councils including ECAR (of which West Virginia was a member), Mid-Atlantic Area Council (MAAC), Midwest Reliability Organization (MRO) and Mid-America Interconnected Network (MAIN). ECAR was formed in 1967 and was one of ten primary regional power groups. According to its website, RFC's mission is "to preserve and enhance electric service reliability and security for the interconnected electric systems within the ReliabilityFirst geographic area. In doing so, we are committed to supporting the efforts of, and serving as an extension of, the North American Electric Reliability Corporation (NERC) in their mission as the Electric

[10] http://nietc.anl.gov/documents/docs/NIETC_ExSum_8Aug08.pdf
[11] Map of area: http://nietc.anl.gov/documents/docs/NIETC_MidAtlantic_Area_Corridor_Map.pdf
[12] The full study is available at http://nietc.anl.gov/congestionstudy/index.cfm.

Reliability Organization (ERO) to ensure the reliability of the bulk power systems across North America." [13]

Following NERC's certification by FERC as the ERO in the United States in 2006 it was allowed to delegate authority "for the purpose of proposing and enforcing reliability standards by entering into delegation agreements with regional entities." [14] RFC is one of the eight approved regional entities in North America under the NERC.



WEST VIRGINIA RELATED EVENTS

PJM's Regional Transmission Expansion Plan Approves Three West Virginia Upgrades in 2007

PJM's 2007 Plan for West Virginia includes three new transmission upgrade plans approved in 2007.[15] The report also includes information on six upgrades approved prior to 2007. The drivers of all of the approved system upgrades are classified as baseline upgrades related to baseline load growth/deliverability & reliability. The plan includes lists of new generating plants requesting interconnection. New generating capacity built closer to load centers is an alternative to transmission expansion. However, the actual build rate as a portion of applications submitted is reported to be less than 40 percent due to changing investment priorities.

Allegheny Energy Proposes the TrAIL line that Addresses One of Three Present Impediments to West-East Power Trade Identified in the PJM Transmission Expansion Plan

[13] http://www.rfirst.org/.
[14] Ibid.
[15] http://www2.pjm.com/planning/downloads/rtep-2007/2007-section4-west-va.pdf

The existing Black Oak-Bedington interface affects power to the "critical congestion" area identified in U.S. DOE's National Corridor congestion study.[16] [17] The interface also impacts other regions south of the corridor such as parts of North Carolina. In a recent report Black Oak-Bedington was also listed as the number one constraint in terms of congestion costs to Dominion North Carolina. Day-ahead congestion costs were $23.6 million for the 5/1/2005 to 4/30/2006 period and $17.6 million for the 5/1/2006 to 4/30/2007 period. The interface contributed negative costs (lower prices) as a balancing constraint for both time periods.[18] The same report listed the Black Oak-Bedington line as providing negative congestion costs in relation to "implicit congestion," defined as costs realized to serve load from generation and contractual energy purchases in a defined area.

AEP Energizes its New Wyoming-to-Jacksons Ferry Transmission Line

This line was energized in June 2006. "A tri-regional assessment of the reliability impacts of this project concluded that the project's delay had caused a reliability risk. The project was expected to mitigate significant reliability risks that have been addressed on a temporary basis by the use of complex operating procedures." [19] [20]

This line runs southeast from the Wyoming County power station in West Virginia to the Jackson's Ferry station in Virginia. The existing Kanawha-Matt Funk line that this new line now relieves was identified as a component of constraint for Dominion North Carolina. Overall congestion costs in the Dominion service territory of North Carolina decreased from 2005-2006 to 2006-2007. Following the installation of the new line the Kanawha-Matt Funk line became a cause of net positive rather than negative congestion costs for the territory. The net contribution of the Bedington-Black Oak interface to congestion costs remained positive but declined.[21]

Need for the TrAIL Challenged in Virginia and West Virginia

Allegheny Energy, via TrAIL Co. is presently negotiating with the WVPSC on determining the best route on which to build the TrAIL line in West Virginia. Evidentiary hearings were held in January 2008 where arguments concerning the need for the line were officially submitted.

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[16] http://nietc.anl.gov/documents/docs/NIETC_MidAtlantic_Area_Corridor_Map.pdf
[17] For the location of the Black Oak-Bedington interface see Exhibit B and C in http://www.pjm.com/documents/downloads/presentations/20050512-pjm-testimony.pdf.
[18] http://www.pjm.com/markets/market-monitor/downloads/mmu-reports/20070724-carolina-congestion.pdf
[19] ftp://www.nerc.com/pub/sys/all_updl/docs/pubs/LTRA2005.pdf
[20] For a map of these facilities see http://www.aep.com/about/transmission/docs/765Map_color.pdf.
[21] Same as #18.

The TrAIL project is opposed by several entities. Three major entities withdrew their opposition between January and April of 2008.

1. Competitive Power Ventures of Maryland withdrew its opposition after its proposed gas-fired power plant near Front Royal, VA was sold to Dominion.[22] It is presumed that the company no longer considers expanded transmission capacity as a competing interest to its generation investments.

2. The Commonwealth of Virginia says designation of the Mid-Atlantic National Interest Corridor is unlawful and applied for a rehearing saying the DOE did not consult with them in conducting the August 2006 congestion study as mandated by a statutory requirement.[23] The application for a rehearing was denied by DOE.

3. The West Virginia PSC and the West Virginia Energy Users Group (WVEUG) agreed to not challenge the need for TrAIL in exchange for delayed rate increases for West Virginia customers, Allegheny's promise to build a transmission management facility in West Virginia and to support an energy conservation/assistance program in the State.

In spite of this agreement WVEUG stated in a May 30, 2008 hearing that it believes the need for the line is still unclear.

AEP is Moving Forward on its "AEP Interstate Project"

AEP, via AEP Transmission Company LLC, and Allegheny Power announced plans April 18, 2007 to form a joint venture to build PATH (Potomac-Appalachian Transmission Highline). PATH encompasses the first half of the AEP I-765 TM Interstate Project. The remaining portion that will run from the proposed Kemptown Station in Maryland into New Jersey is not part of the joint venture with Allegheny.[24]

As of March 2008, AEP and Allegheny Power have begun working on routing studies and environmental assessments for the projects. Following the completion of the routing studies, the companies anticipate seeking regulatory approvals for the project from the utility commissions in both WV and MD in the fourth quarter 2008.[25]

[22] http://wvgazette.com/News/Series/200801130475
[23] http://www.oe.energy.gov/DocumentsandMedia/NIETC_Order_Denial_Report_(72_FR_56992).PDF
[24] http://www.aep.com/newsroom/newsreleases/default.asp?dbcommand=DisplayRelease&ID=1378
[25] http://yahoo.brand.edgar-online.com/EFX_dll/EDGARpro.dll?FetchFilingHTML1?SessionID=oWqBW0_nbPmCInB&ID=5342438