REPORT TO THE NORTH CAROLINA STATE CORPORATION COMMISSION: Congestion in the Dominion Service Territory in North Carolina

Overview of Congestion Calculations

This report provides details of congestion associated with Dominion's (DOM) service territory within the state of North Carolina for the periods of May 1, 2005 to April 30, 2006 and May 1, 2006 to April 30, 2007. Congestion calculations are for the entire territory and not for any specific organization; the total congestion calculations are the sum of all the congestion calculations for the organizations with market activity in the area. The report also includes congestion event hours for the constraints which had the largest impact on congestion charges in DOM, either positive or negative, and the congestion charges associated with each constraint. [1]

Total congestion costs are comprised of Implicit Congestion, Spot Congestion and Explicit Congestion. Implicit Congestion is the net congestion cost to serve load from generation and contractual energy purchases in a defined area, Spot Congestion is the net congestion cost associated with Spot Market purchases and sales and Explicit Congestion is the net congestion cost associated with point-to-point energy transactions. Each of these categories of congestion costs are, in turn, comprised of day-ahead and balancing congestion costs. Day-ahead congestion is based solely on day-ahead MW while balancing congestion is based on deviations between the day-ahead and real-time MW. [2]

Table 1 shows a summary of the congestion charges associated with the North Carolina portion of the DOM service territory since its integration in May 2005.

Table 1 Dominion-NC Total Day-Ahead and Balancing Congestion Costs.

Total Congestion Costs (in millions)					
Period	State	Zone	Day-Ahead	Balancing	Total
May 1, 2005 - April 30, 2006	NC	DOM	$36.1	($5.7)	$30.4
May 1, 2006 - April 30, 2007	NC	DOM	$30.8	($5.9)	$24.9

[1] Congestion event hours are defined as the sum of all intervals where a transmission constraint is binding. In day ahead, an interval equals one hour. In real time, an interval equals five minutes. Thus, real-time event hours are the number of constrained intervals divided by 12.

[2] See Table 20, "Congestion Definitions," for a summary of relevant definitions.

Congestion charges can be both positive and negative. When a constraint binds, the price effects of that constraint vary. The unconstrained system marginal price (SMP) is uniform for all areas, while the congestion components of LMP will either be positive or negative in a specific area, meaning that actual LMPs are above or below the SMP. Usually a smaller area affected by the constraint will experience increased prices and the larger unconstrained system will see lower prices. If an area is located upstream from the constrained element, the area will experience negative congestion costs (lower prices) from that constrained element. Conversely, positive congestion costs occur when an area is located downstream from a constrained element. Balancing congestion results from load or generation deviations between Day-Ahead and Real-Time markets. If a participant has real-time generation or load that is less than its day-ahead generation or load then the deviation will be negative. For example, if a constraint has a positive congestion component of LMP for a bus where a deviation is negative, negative balancing congestion costs will result. Conversely, if a participant has real-time generation or load that is greater than its day-ahead generation or load then the deviation will be positive.

Table 2 shows the constraints with the largest impact on congestion costs in Dominion from May 1, 2005 – April 30, 2006. There were large positive contributions to congestion from the Bedington – Black Oak Interface and the Kammer Transformer. Several constraints contributed to negative congestion costs in Dominion, including the Kanawha – Matt Funk 765 line and the East and Central Interfaces. All of these constraints are located outside of the Dominion service territory.

Table 2 Dominion-NC Day-ahead and Balancing Congestion Costs by Constraint (5/1/2005 – 4/30/2006).

			Total Congestion Costs by Constraint (in millions)				
Constraint Name	Type	Location	Day-Ahead	Balancing	Total	Day-Ahead Event Hours	Real-Time Event Hours
Bedington - Black Oak	Interface	500	$23.6	($6.9)	$16.8	4,934	2,045
Kammer	Transformer	500	$5.6	$0.2	$5.8	4,316	1,900
Kanawha - Matt Funk	Line	AEP	$2.4	($5.3)	($2.9)	1,559	909
Branchburg - Readington	Line	PSEG	($0.3)	$1.7	$1.4	745	330
Central	Interface	500	($1.3)	$0.1	($1.2)	890	21
AP South	Interface	500	$1.3	($0.2)	$1.0	697	155
Wylie Ridge	Transformer	APS	$1.1	($0.0)	$1.0	2,267	1,779
Beechwood - Kerr Dam	Line	DOM	$0.8	($0.0)	$0.8	233	204
Mount Storm - Pruntytown	Line	APS	$2.8	($2.1)	$0.7	379	986
East	Interface	500	($0.7)	$0.1	($0.6)	655	16
Loudoun - Morrisville	Line	DOM	($0.0)	$0.5	$0.5	32	48
Cloverdale - Lexington	Line	AEP	$0.7	($0.3)	$0.4	691	611
5004/5005 Interface	Interface	500	($0.9)	$1.3	$0.4	2,350	607
Cedar Grove - Roseland	Line	PSEG	($1.0)	$0.7	($0.3)	2,502	530
Meadow Brook	Transformer	APS	($0.1)	($0.2)	($0.3)	758	221

Table 3 shows the constraints with the largest impact on total congestion costs in Dominion from May 1, 2006 – April 30, 2007. The Bedington – Black Oak Interface, the

Cloverdale - Lexington 765 kV line and the Mount Storm – Pruntytown 500 kV line were among the top positive contributors to the total congestion costs. The Branchburg - Readington 230 kV line, the Cedar Grove – Roseland 230 kV line, and the Central Interface were the largest contributors to negative congestion costs.

Table 3 Dominion-NC Day-ahead and Balancing Congestion Costs by Constraint (5/1/2006 – 4/30/2007).

Total Congestion Costs by Constraint (in millions)							
Constraint Name	Type	Location	Day-Ahead	Balancing	Total	Day-Ahead Event Hours	Real-Time Event Hours
Bedington - Black Oak	Interface	500	$17.6	($3.4)	$14.2	2,580	1,679
Mount Storm - Pruntytown	Line	APS	$4.8	($0.3)	$4.5	891	478
Cloverdale - Lexington	Line	AEP	$5.3	($1.5)	$3.8	1,644	1,542
Cedar Grove - Roseland	Line	PSEG	($1.9)	$0.2	($1.7)	2,515	486
Kanawha - Matt Funk	Line	AEP	$1.2	$0.5	$1.7	790	234
Danville - East Danville	Line	DOM	$1.5	$0.0	$1.5	666	27
Branchburg - Readington	Line	PSEG	($2.2)	$0.7	($1.5)	544	774
Central	Interface	500	($1.4)	$0.0	($1.4)	751	18
Meadow Brook	Transformer	APS	($1.4)	$0.1	($1.3)	596	194
Axton	Transformer	AEP	$1.4	($0.2)	$1.2	218	35
Axton - Jacksons Ferry	Line	AEP	$0.8	($0.0)	$0.8	380	10
Muskingum River - Ohio Ce	Line	AEP	($0.0)	$0.7	$0.7	12	25
Kammer	Transformer	500	$0.6	($0.0)	$0.6	594	455
Brighton	Transformer	PEPCO	$0.0	($0.6)	($0.6)	3	79
Beechwood - Kerr Dam	Line	DOM	$1.0	($0.4)	$0.6	378	282

Table 1, Table 2 and Table 3 provide a summary of the total congestion charges in the North Carolina portion of Dominion. In order to provide a more detailed explanation of the congestion calculations from which the total congestion charges are derived, each category of congestion is defined and a table of the congestion charges or credits associated with each category is provided.

Net Congestion Bill

The net congestion bill is one component of Implicit Congestion costs and is calculated by subtracting generating congestion credits from load congestion payments. The logic is that increased congestion payments by load are offset by increased congestion revenues to generation, for the area analyzed. This analysis does not explicitly address whether the generation credits and load payments all flow through to customers. Table 4 shows a summary of all load congestion payments and generation congestion credits for the Dominion service territory in North Carolina.

Table 4 Dominion-NC Load Congestion Payments and Generation Congestion Credits.

	Load Congestion Payments (in millions)		Generation Congestion Credits (in millions)		Net Congestion Bill (in millions)		
Period Beginning	Day-Ahead	Balancing	Day-Ahead	Balancing	Day-Ahead	Balancing	Total
5/1/2005	$48.9	$47.5	$20.3	$55.5	$28.6	($8.0)	$20.6
5/1/2006	$48.8	$41.4	$21.6	$48.9	$27.2	($7.5)	$19.7

Load Congestion Payments and Generation Congestion Credits are calculated for both the Day-ahead and Balancing Energy Markets.

- Day-ahead Load Congestion Payments. Day-ahead load congestion payments are calculated for all cleared demand, decrement bids, and day-ahead energy sale transactions. (Decrement bids and energy sales can be thought of as scheduled load.) Day-ahead load congestion payments are calculated using load MW and the congestion component of LMP (CLMP) for the load bus, decrement bid location, or the source of the sale transaction, as applicable.

- Day-ahead Generation Congestion Credits. Day-ahead generation congestion credits are calculated for all cleared generation and increment offers and day-ahead energy purchase transactions. (Increment offers and energy purchases can be thought of as scheduled generation.) Day-Ahead generation congestion credits are calculated using generation MW and the CLMP for the generator bus, increment offer location, or the sink of the purchase transaction, as applicable.

- Balancing Load Congestion Payments. Balancing load congestion payments are calculated for all deviations between a PJM Member's real-time load and energy sale transactions and their day-ahead cleared demand, decrement bids, and energy sale transactions. Balancing load congestion payments are calculated using MW deviations and the real-time CLMP for each bus where a deviation from a member's day-ahead scheduled load exists.

- Balancing Generation Congestion Credits. Balancing generation congestion credits are calculated for all deviations between a PJM Member's real-time generation and energy purchase transactions and the day-ahead cleared generation, increment offers and energy purchase transactions. Balancing generation congestion credits are calculated using MW deviations and the real-time CLMP for each bus where a deviation from a member's day-ahead scheduled generation exists.

Table 5 and Table 6 show the impact of each constraint on load congestion payments and generation congestion credits. In both periods, Bedington - Black Oak had the largest impact on congestion payments and congestion credits in the Dominion service territory of North Carolina.

Table 5 Dominion-NC Day-ahead and Balancing Load Congestion Payments and Generation Congestion Credits by Constraint (5/1/2005 – 4/30/2006).

	Load Congestion Payments		Generation Congestion Credits		Net Congestion Bill		
Constraint	Day-Ahead	Balancing	Day-Ahead	Balancing	Day-Ahead	Balancing	Total
Bedington - Black Oak	$41.9	$23.8	$21.0	$31.7	$21.0	($7.9)	$13.1
Kammer	$5.8	$4.3	$1.5	$5.0	$4.3	($0.7)	$3.6
Kanawha - Matt Funk	$8.5	$11.0	$7.0	$15.9	$1.5	($4.9)	($3.4)
Branchburg - Readington	($1.2)	($2.5)	($0.9)	($4.3)	($0.3)	$1.7	$1.4
Central	($2.9)	($0.1)	($1.7)	($0.2)	($1.3)	$0.1	($1.2)
AP South	$2.0	$0.9	$0.9	$1.2	$1.1	($0.3)	$0.8
Beechwood - Kerr Dam	$1.4	$1.7	$0.6	$1.7	$0.8	($0.0)	$0.8
East	($1.5)	($0.1)	($0.9)	($0.1)	($0.6)	$0.1	($0.6)
Loudoun - Morrisville	($0.1)	($0.5)	($0.1)	($1.1)	($0.0)	$0.6	$0.5
Wylie Ridge	$0.7	$1.6	$0.1	$1.8	$0.6	($0.2)	$0.4
Cloverdale - Lexington	$0.8	$2.1	$0.2	$2.3	$0.6	($0.2)	$0.4
Cedar Grove - Roseland	($3.2)	($5.1)	($2.3)	($5.8)	($0.9)	$0.7	($0.3)
Mount Storm - Pruntytown	$3.9	$12.6	$1.4	$15.2	$2.4	($2.6)	($0.2)
Cloverdale	$0.2	$0.0	$0.1	$0.0	$0.2	$0.0	$0.2
Axton - Jacksons Ferry	$0.3	$0.1	$0.1	$0.1	$0.2	($0.0)	$0.2
Meadow Brook	($0.3)	$0.1	($0.2)	$0.2	($0.1)	($0.1)	($0.1)

Table 6 Dominion-NC Day-ahead and Balancing Load Congestion Payments and Generation Congestion Credits by Constraint (5/1/2006 – 4/30/2007).

	Load Congestion Payments		Generation Congestion Credits		Net Congestion Bill		
Constraint	Day-Ahead	Balancing	Day-Ahead	Balancing	Day-Ahead	Balancing	Total
Bedington - Black Oak	$30.6	$23.7	$14.3	$28.3	$16.3	($4.6)	$11.7
Mount Storm - Pruntytown	$8.6	$6.2	$4.3	$6.8	$4.3	($0.6)	$3.7
Cloverdale - Lexington	$6.6	$8.4	$2.5	$9.9	$4.1	($1.5)	$2.5
Cedar Grove - Roseland	($3.9)	($2.0)	($2.0)	($2.2)	($1.9)	$0.2	($1.7)
Branchburg - Readington	($4.3)	($5.2)	($2.1)	($5.9)	($2.2)	$0.7	($1.5)
Danville - East Danville	$2.1	$0.5	$0.8	$0.5	$1.4	$0.0	$1.4
Central	($3.0)	($0.1)	($1.6)	($0.1)	($1.4)	$0.0	($1.3)
Kanawha - Matt Funk	$2.6	$2.0	$1.5	$1.8	$1.0	$0.3	$1.3
Axton	$3.6	$0.4	$2.2	$0.6	$1.4	($0.2)	$1.2
Meadow Brook	($1.8)	($0.2)	($1.0)	($0.2)	($0.8)	$0.1	($0.7)
Axton - Jacksons Ferry	$1.7	$0.1	$0.9	$0.1	$0.7	($0.0)	$0.7
Muskingum River - Ohio Cer	($0.0)	($0.8)	($0.0)	($1.5)	($0.0)	$0.7	$0.7
Beechwood - Kerr Dam	$2.0	$1.9	$1.1	$2.2	$1.0	($0.4)	$0.6
Brighton	$0.0	$1.0	$0.0	$1.6	$0.0	($0.6)	($0.6)
5004/5005 Interface	($2.6)	($0.7)	($1.5)	($1.2)	($1.1)	$0.5	($0.6)
East	($0.9)	($0.0)	($0.4)	($0.0)	($0.5)	$0.0	($0.5)

Spot Market Congestion Costs

Spot Market congestion costs are the second component of Implicit Congestion costs. Spot Market congestion costs are those congestion costs incurred by a PJM member's net Spot Market purchases or sales. Net Spot Market purchases or sales are the difference between a participant's total energy supply (including both generation and contractual energy purchases) and its energy demand (including both load and contractual energy sales). If supply exceeds demand, there is a net Spot Market sale and if demand exceeds supply there is a net Spot Market purchase.

- Day-Ahead Spot Market congestion charges are calculated based on a participant's net Spot Market position in the Day–Ahead Market. If a participant's position is a net purchaser in an hour then the participant's Spot Market congestion price is a load weighted-average CLMP based on their load position at each bus. There is a load weighted-average CLMP calculated for each constraint. For example, if there are three constraints then are three unique prices (load weighted-average CLMPs) for each constraint, which when multiplied by the participant's net position and summed will add up to the total Spot Market congestion charges for that participant.

- Day-Ahead Spot Market congestion credits are calculated based on a participant's net Spot Market position in the Day-Ahead Market. If a participant's position is a net seller in an hour then the participant's Spot Market congestion price is a generation weighted-average CLMP based on their

generation position at each bus. There is a generation weighted-average CLMP calculated for each constraint. For example, if there are three constraints then there are three unique prices (generation weighted-average CLMPs) for each constraint, which when multiplied by the participant's net position and summed will add up to the total Spot Market congestion credits for that participant.

- Balancing Spot Market congestion charges are calculated based on a participant's real-time deviations from their day-ahead net hourly Spot Market purchases. The participant's Spot Market congestion price is based on the load deviation weighted-average CLMP based on their real-time load deviations from day ahead at each bus. If no load deviations exist, the Spot Market congestion price is based on a real-time, load weighted-average CLMP using their real-time load at each bus.

- Balancing Spot Market congestion credits are calculated based on a participant's real-time deviations from their day-ahead, net hourly Spot Market sales. The participant's Spot Market congestion price is based on the generation deviation-weighted CLMP based on their real-time generation deviations from day ahead at each bus. If no generation deviations exist, the Spot Market congestion price is based on a real-time, generation-weighted CLMP using their real-time generation at each bus.

Spot Market Congestion Charges and Spot Market Congestion Credits for the Dominion service territory in North Carolina are calculated based on the each participant's net interchange MW in the North Carolina portion of Dominion, or the difference between their load and generation in the North Carolina portion of Dominion. However, the spot market prices used are uniform across all zones and reflect a participant's entire net interchange position in PJM and are not unique to Dominion. This is done to be consistent with PJM congestion charges that are calculated on a system-wide basis and not a zonal or state basis.

Total Spot Market Congestion Charges for Dominion North Carolina are the difference between the sum of all participants' Day-ahead and Balancing Spot Market Congestion Charges and the sum of all participants' Day-ahead and Balancing Spot Market Congestion Credits within the North Carolina portion of Dominion.

Table 7 shows that the total spot market congestion charges in Dominion North Carolina for both periods.

Table 7 Dominion-NC Total Spot Market Congestion Costs.

Spot Market Congestion Costs (in millions)			
Period Beginning	Day-Ahead	Balancing	Total
5/1/2005	$45.6	($8.6)	$36.9
5/1/2006	$37.7	($9.4)	$28.3

Table 8 and Table 9 show that the Bedington – Black Oak Interface was the largest contributor to Spot Congestion Costs in Dominion North Carolina for both periods.

Table 8 Dominion-NC Spot Market Congestion Costs by Constraint (5/1/2005 – 4/30/2006).

Spot Market Congestion Costs (in millions)			
Constraint	Day-Ahead	Balancing	Total
Bedington - Black Oak	$26.4	($6.6)	$19.8
Kammer	$6.3	($0.7)	$5.5
AP South	$2.5	($0.2)	$2.3
Kanawha - Matt Funk	$1.7	($3.8)	($2.1)
Branchburg - Readington	($0.3)	$1.6	$1.3
5004/5005 Interface	$0.2	$0.9	$1.1
Central	($1.2)	$0.1	($1.1)
Wylie Ridge	$1.2	($0.3)	$0.9
East	($0.6)	$0.0	($0.6)
Cloverdale - Lexington	$0.8	($0.2)	$0.6
Mount Storm - Pruntytown	$2.6	($2.1)	$0.5
Meadow Brook	$0.6	($0.1)	$0.5
Cedar Grove - Roseland	($1.0)	$0.6	($0.4)
Loudoun - Morrisville	$0.0	$0.2	$0.3
Cloverdale	$0.2	$0.0	$0.2
Axton - Jacksons Ferry	$0.1	($0.0)	$0.1

Table 9 Dominion-NC Spot Market Congestion Costs by Constraint (5/1/2006 – 4/30/2007).

Spot Market Congestion Costs (in millions)			
Constraint	Day-Ahead	Balancing	Total
Bedington - Black Oak	$19.5	($4.5)	$15.0
Mount Storm - Pruntytown	$4.4	($0.6)	$3.9
Cloverdale - Lexington	$5.8	($2.4)	$3.4
Cedar Grove - Roseland	($1.9)	$0.2	($1.7)
Branchburg - Readington	($2.2)	$0.7	($1.5)
AP South	$2.4	($1.0)	$1.4
Kanawha - Matt Funk	$1.0	$0.3	$1.3
Central	($1.3)	$0.0	($1.3)
Danville - East Danville	$1.0	$0.0	$1.1
Axton	$1.2	($0.1)	$1.0
Aqueduct - Doubs	$0.8	($0.1)	$0.8
Muskingum River - Ohio Central	($0.0)	$0.6	$0.6
Cloverdale	$0.7	($0.1)	$0.6
Brighton	$0.0	($0.6)	($0.6)
Kammer	$0.8	($0.2)	$0.5
Axton - Jacksons Ferry	$0.6	($0.0)	$0.5

Implicit Congestion Costs

Implicit Congestion costs are the congestion costs for moving generation to load across a constrained system. Implicit Congestion costs are derived by calculating an hourly net congestion bill for each market participant and subtracting their Spot Market congestion costs. Implicit Congestion costs equal the net congestion bill minus Spot Market congestion costs. If a participant has no Spot Market net interchange, then the Implicit Congestion costs will equal the net congestion bill for that participant.

The Total Implicit Congestion Charges calculated for the North Carolina portion of Dominion represent the sum of all congestion charges associated with each participant's load and generation located within North Carolina and Dominion (net congestion bill) minus the sum of all congestion costs associated with each participant's spot purchases and spot sales located within North Carolina and Dominion.

Table 10 shows total implicit congestion charges in Day-Ahead increased by 47 percent, but were still negative from the period beginning May 1, 2005 to the period beginning May 1, 2006.

Table 10 Dominion-NC Total Implicit Congestion Costs.

Implicit Congestion Costs (in millions)			
Period Beginning	Day-Ahead	Balancing	Total
5/1/2005	($17.0)	$0.6	($16.3)
5/1/2006	($10.5)	$1.9	($8.7)

Table 11 shows the Bedington - Black Oak Interface had the largest impact on implicit congestion costs and increased by 3.5 million dollars from the period beginning in May 2005 to the period beginning in May 2006.

Table 11 Dominion-NC Implicit Congestion Costs by Constraint (5/1/2005 – 4/30/2006).

Implicit Congestion Costs (in millions)			
Constraint	Day-Ahead	Balancing	Total
Bedington - Black Oak	($5.4)	($1.3)	($6.7)
Kammer	($2.0)	$0.0	($2.0)
AP South	($1.4)	($0.0)	($1.4)
Kanawha - Matt Funk	($0.3)	($1.1)	($1.3)
5004/5005 Interface	($1.2)	$0.3	($1.0)
Beechwood - Kerr Dam	$0.7	($0.0)	$0.7
Mount Storm - Pruntytown	($0.2)	($0.5)	($0.7)
Meadow Brook	($0.7)	$0.0	($0.6)
Wylie Ridge	($0.6)	$0.1	($0.5)
Loudoun - Morrisville	($0.1)	$0.3	$0.3
Cloverdale - Lexington	($0.2)	$0.1	($0.2)
Branchburg - Readington	($0.0)	$0.1	$0.1
Cedar Grove - Roseland	$0.0	$0.1	$0.1
Halifax - Mount Laurel	$0.0	$0.0	$0.1
Central	($0.1)	$0.0	($0.1)
Cloverdale	($0.0)	$0.0	($0.0)

Table 12 Dominion-NC Implicit Congestion Costs by Constraint (5/1/2006 – 4/30/2007).

Implicit Congestion Costs (in millions)			
Constraint	Day-Ahead	Balancing	Total
Bedington - Black Oak	($3.2)	($0.1)	($3.2)
AP South	($1.3)	$0.1	($1.1)
Meadow Brook	($1.0)	$0.0	($0.9)
Cloverdale - Lexington	($1.7)	$0.8	($0.9)
Aqueduct - Doubs	($0.5)	$0.0	($0.5)
Beechwood - Kerr Dam	$0.9	($0.3)	$0.5
5004/5005 Interface	($0.6)	$0.2	($0.4)
Dooms	($0.3)	($0.1)	($0.4)
Halifax - Mount Laurel	$0.1	($0.5)	($0.3)
Danville - East Danville	$0.3	($0.0)	$0.3
Cloverdale	($0.2)	$0.0	($0.2)
Mount Storm - Pruntytown	($0.1)	($0.1)	($0.2)
Axton	$0.3	($0.1)	$0.2
Wylie Ridge	($0.3)	$0.1	($0.2)
Axton - Jacksons Ferry	$0.2	($0.0)	$0.2
North Anna - Ladysmith	$0.0	$0.1	$0.1

Explicit Congestion Costs

Explicit Congestion costs are the congestion costs associated with moving energy from one specific point to another across the transmission system. Point-to-point transactions may be either internal to PJM or be import or export transactions. Explicit Congestion charges equal the difference between source and sink CLMPs for a point-to-point transaction.

- Internal Purchases – For internal purchases the Explicit Congestion charges are calculated based on the difference in CLMPs between the sink bus and source bus of the purchase.

- Import & Export Transactions – For point-to-point and network secondary transmission customers, the Explicit Congestion charges are calculated based on the difference between source and sink CLMP, specific to each constraint.

The Explicit Congestion Costs calculated for the North Carolina portion of Dominion represent the costs associated with point to point transactions that sink into the North Carolina portion of Dominion. For example, if a transaction is sourced in Pennsylvania and sinks into Dominion North Carolina, the charges would be based on the MW of the transaction multiplied by the difference between the sink CLMP and the source CLMP. When calculated using this method, all congestion is allocated to the zone and state of the sink location.

Table 13 shows a 4.6 million dollar decrease in Explicit Congestion Costs from the period beginning May 2005 to the period beginning May 2006.

Table 13 Dominion-NC Total Explicit Congestion Costs.

Explicit Congestion Costs (in millions)			
Period Beginning	Day-Ahead	Balancing	Total
5/1/2005	$7.5	$2.3	$9.8
5/1/2006	$3.6	$1.6	$5.2

Table 14 and Table 15 show a breakdown of the explicit congestion costs by constraint.

Table 14 Dominion-NC Explicit Congestion Costs by Constraint (5/1/2005– 4/30/2006).

Explicit Congestion Costs (in millions)			
Constraint	Day-Ahead	Balancing	Total
Bedington - Black Oak	$2.6	$1.1	$3.7
Kammer	$1.3	$0.9	$2.2
Mount Storm - Pruntytown	$0.4	$0.5	$0.9
Wylie Ridge	$0.4	$0.2	$0.6
Kanawha - Matt Funk	$0.9	($0.4)	$0.5
5004/5005 Interface	$0.2	$0.1	$0.3
AP South	$0.1	$0.1	$0.2
Meadow Brook	$0.0	($0.1)	($0.1)
Cedar Grove - Roseland	($0.0)	($0.0)	($0.0)
Cloverdale	$0.0	$0.0	$0.0
Axton - Jacksons Ferry	$0.0	$0.0	$0.0
Cloverdale - Lexington	$0.1	($0.1)	$0.0
Danville - East Danville	$0.0	($0.0)	$0.0
East	($0.0)	$0.0	($0.0)
Central	($0.0)	$0.0	($0.0)
Branchburg - Readington	($0.0)	($0.0)	($0.0)

Table 15 Dominion-NC Explicit Congestion Costs by Constraint (5/1/2006 – 4/30/2007).

Explicit Congestion Costs (in millions)			
Constraint	Day-Ahead	Balancing	Total
Bedington - Black Oak	$1.3	$1.2	$2.5
Cloverdale - Lexington	$1.3	$0.0	$1.3
Mount Storm - Pruntytown	$0.5	$0.3	$0.8
Meadow Brook	($0.6)	$0.1	($0.5)
Kanawha - Matt Funk	$0.1	$0.2	$0.4
Wylie Ridge	$0.2	$0.0	$0.2
Kammer	$0.1	$0.1	$0.2
Danville - East Danville	$0.2	($0.0)	$0.2
Dooms	$0.1	($0.3)	($0.1)
AP South	$0.1	$0.0	$0.1
Axton - Jacksons Ferry	$0.1	($0.0)	$0.1
5004/5005 Interface	$0.0	$0.1	$0.1
Aqueduct - Doubs	$0.0	$0.0	$0.1
Cloverdale	$0.1	$0.0	$0.1
Halifax - Mount Laurel	$0.0	($0.1)	($0.1)
Central	($0.0)	$0.0	($0.0)

Total Congestion Costs

Table 16, Table 17 and Table 18 present data on total congestion costs by category.

Table 16 Dominion-NC Total Congestion Costs by Category

Total Congestion Costs by Category (in millions)				
Period Beginning	Implicit Congestion Charges	Spot Congestion Charges	Explicit Congestion Charges	Total Congestion Charges
5/1/2005	$ (16.3)	$ 36.9	$ 9.8	$ 30.4
5/1/2006	$ (8.7)	$ 28.3	$ 5.2	$ 24.9
Difference	$ 7.7	$ (8.6)	$ (4.6)	$ (5.5)

Table 17 Dominion-NC Total Congestion Costs by Category and Constraint (5/1/2005 – 4/30/2006)

	Total Congestion Cost by Category (in millions)			
Constraint	Implicit Congestion Charges	Spot Congestion Charges	Explicit Congestion Charges	Total Congestion Charges
Bedington - Black Oak	($6.7)	$19.8	$3.7	$16.8
Kammer	($2.0)	$5.5	$2.2	$5.8
Kanawha - Matt Funk	($1.3)	($2.1)	$0.5	($2.9)
Branchburg - Readington	$0.1	$1.3	($0.0)	$1.4
Central	($0.1)	($1.1)	($0.0)	($1.2)
Wylie Ridge	($0.5)	$0.9	$0.6	$1.0
Beechwood - Kerr Dam	$0.7	$0.1	($0.0)	$0.8
Mount Storm - Pruntytown	($0.7)	$0.5	$0.9	$0.7
Cloverdale - Lexington	($0.2)	$0.6	$0.0	$0.4
Cedar Grove - Roseland	$0.1	($0.4)	($0.0)	($0.3)
Meadow Brook	($0.6)	$0.5	($0.1)	($0.3)
Axton - Jacksons Ferry	$0.0	$0.1	$0.0	$0.2
Danville - East Danville	$0.0	$0.1	$0.0	$0.1
Axton	$0.0	$0.0	$0.0	$0.0
Muskingum River - Ohio Central	$0.0	$0.0	($0.0)	$0.0
Brighton	($0.0)	($0.0)	$0.0	($0.0)

Table 18 Dominion-NC Total Congestion Costs by Category and Constraint (5/1/2006 – 4/30/2007)

	Total Congestion Cost by Category (in millions)			
Constraint	Implicit Congestion Charges	Spot Congestion Charges	Explicit Congestion Charges	Total Congestion Charges
Bedington - Black Oak	($3.2)	$15.0	$2.5	$14.2
Mount Storm - Pruntytown	($0.2)	$3.9	$0.8	$4.5
Cloverdale - Lexington	($0.9)	$3.4	$1.3	$3.8
Cedar Grove - Roseland	$0.1	($1.7)	($0.0)	($1.7)
Kanawha - Matt Funk	$0.0	$1.3	$0.4	$1.7
Danville - East Danville	$0.3	$1.1	$0.2	$1.5
Branchburg - Readington	$0.0	($1.5)	($0.0)	($1.5)
Central	($0.1)	($1.3)	($0.0)	($1.4)
Meadow Brook	($0.9)	$0.2	($0.5)	($1.3)
Axton	$0.2	$1.0	$0.0	$1.2
Axton - Jacksons Ferry	$0.2	$0.5	$0.1	$0.8
Muskingum River - Ohio Central	$0.0	$0.6	$0.0	$0.7
Kammer	($0.1)	$0.5	$0.2	$0.6
Brighton	($0.0)	($0.6)	($0.0)	($0.6)
Beechwood - Kerr Dam	$0.5	$0.1	$0.0	$0.6
Wylie Ridge	($0.2)	$0.5	$0.2	$0.5

Table 19 shows the difference in total congestion costs by category. Congestion costs resulting from the Bedington – Black Oak Interface and the Kammer transformer decreased by 2.5 and 5.1 million dollars, respectively. While congestion costs resulting from the Cloverdale – Lexington 500 kV line and the Mount Storm - Pruntytown line increased by 3.4 and 3.7 million dollars, respectively.

Table 19 Difference in Total Congestion Costs by Category and Constraint for Dominion-NC.

Difference in Total Congestion Costs by Category (in millions)				
Constraint	Implicit Congestion Charges	Spot Congestion Charges	Explicit Congestion Charges	Total Congestion Charges
Bedington - Black Oak	$3.5	($4.8)	($1.2)	($2.5)
Mount Storm - Pruntytown	$0.5	$3.3	($0.1)	$3.7
Cloverdale - Lexington	($0.7)	$2.9	$1.3	$3.4
Cedar Grove - Roseland	($0.0)	($1.4)	$0.0	($1.4)
Kanawha - Matt Funk	$1.3	$3.4	($0.2)	$4.5
Danville - East Danville	$0.3	$1.0	$0.1	$1.4
Branchburg - Readington	($0.1)	($2.8)	($0.0)	($2.9)
Central	$0.0	($0.2)	($0.0)	($0.2)
Meadow Brook	($0.3)	($0.3)	($0.4)	($1.0)
Axton	$0.2	$1.0	$0.0	$1.2
Axton - Jacksons Ferry	$0.1	$0.4	$0.1	$0.6
Muskingum River - Ohio Central	$0.0	$0.6	$0.0	$0.6
Kammer	$1.9	($5.0)	($2.0)	($5.1)
Brighton	($0.0)	($0.6)	($0.0)	($0.6)
Beechwood - Kerr Dam	($0.2)	$0.0	$0.0	($0.2)
Wylie Ridge	$0.3	($0.4)	($0.4)	($0.5)

Conclusion

Congestion costs in the Dominion service territory of North Carolina decreased from 2005-2006 to 2006-2007. Implicit Congestion costs increased by 7.7 million dollars from the period beginning May 1, 2005 to the period beginning May 1, 2006 and the Bedington – Black Oak Interface had the largest contribution of 3.2 million dollars. Spot Congestion costs were less in 2006-2007 than 2005-2006 by 8.6 million dollars and total Explicit Congestion charges decreased by 4.6 million dollars from one period to the next. The overall congestion costs in the Dominion service territory of North Carolina decreased by 5.5 million dollars.

ARRs and FTRs are designed to provide a hedge against congestion costs. This report does not include data on either ARRs or FTRs. That information will be provided in a future report. The data on ARRs and FTRs and congestion need to be considered together when evaluating the net impact of congestion on an area.

Congestion Definitions

Table 20 Congestion Definitions

Congestion Category	Calculation
Load Congestion Payments	Demand MWh * CLMP
Generation Congestion Credits	Supply MWh * CLMP
Net Congestion Bill	Load Congestion Payments - Generation Congestion Credits
Spot Market Congestion Credits	Net Interchange * Generation Weighted CLMP
Spot Market Congestion Charges	Net Interchange * Load Weighted CLMP
Spot Market Congestion Costs	Spot Market Congestion Charges - Spot Market Congestion Credits
Implicit Congestion Costs	Net Congestion Bill - Spot Market Congestion Costs
Explicit Congestion Costs	Transaction MW * (Sink CLMP - Source CLMP)
Total Congestion Costs	Implicit Congestion Costs + Spot Congestion Costs + Explicit Congestion Costs

MWh Category	Definition
Day-Ahead Demand MWh	Cleared Demand, Decrement Bids, Energy Sale Transactions
Day-Ahead Supply MWh	Cleared Generation, Increment Bids, Energy Purchase Transactions
Real-Time Demand MWh	Load and Energy Sale Transactions
Real-Time Supply MWh	Generation and Energy Purchase Transactions
Balancing Demand MWh	Real-Time Demand MWh - Day-Ahead Demand MWh
Balancing Supply MWh	Real-Time Supply MWh - Day-Ahead Supply MWh