



Your Touchstone Energy® Cooperative 

## **CBM/TRM METHODOLOGY/CALCULATIONS**

### **PL-MOD-2**

**Effective Date: 7/7/09**

<b>Document Information</b>		
<b>Current Revision</b>	<b>Review Cycle</b>	<b>Subject to External Audit</b>
Rev. 5.0	Seasonal (March, May, Sept., Nov.)	Yes

<b>Big Rivers Corporate Approvals</b>		
Prepared By	Chris Bradley	
Approval - Supervisor	N/A	
Approval - Dept. Manager	Glen Thweatt	Yes
Approval - Vice President	David Crockett	7/7/09

Revision Information				
Number	Date	Notes	Revised by	Approved
Rev. 0.0	3/14/07	New Document - Replaces dated CBM/TRM document	Chris Bradley	Yes
Rev. 1.0	4/16/07	Reviewed TRM/CBM values – no change needed	Chris Bradley	Yes
	10/18/07	Reviewed TRM/CBM values – no change needed	Chris Bradley	Yes
Rev. 2.0	12/19/07	Reviewed TRM/CBM values – added values for new flowgate	Chris Bradley	Yes
Rev. 3.0	1/23/08	Recalculate & update import TRM & CBM methodology	Chris Bradley	Yes
	5/23/08	Reviewed TRM/CBM values – no change needed	Chris Bradley	Yes
	9/10/08	Reviewed TRM/CBM values – no change needed	Chris Bradley	Yes
Rev. 4.0	12/16/08	Changed to new logo	Chris Bradley	Yes
	3/11/09	Reviewed TRM/CBM values – no change or approval needed	Chris Bradley	Yes
Rev 5.0	4/1/09	Updated TRM/CBM values	Matt Burns	Yes

Related Standards	Requirements	Documents	Comments
MOD-004-0			
MOD-005-0			
MOD-006-0			
MOD-007-0			
MOD-008-0			
MOD-009-0			

Document Approval Checklist	
Task	Date Completed
1. Provide updated values to TVA RC	4/8/09
2.	
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# CBM/TRM METHODOLOGY/CALCULATIONS

**Capacity Benefit Margin (CBM):** CBM is defined as the amount of transmission transfer capability set aside to ensure access to generation from interconnected systems to meet generation reliability requirements. To ensure consistency with its generation planning criteria, Big Rivers determines CBM requirements on a loss of largest unit basis. Big Rivers currently has a financially firm commitment for its generation requirements (Another entity has leased, and operates, all Big Rivers owned generating plants. This entity is required to meet its commitment regardless of the generating unit availability). Because of this arrangement, Big Rivers does not perform a traditional generation reliability assessment. The loss of largest unit CBM methodology is consistent with the existing generation arrangement. This methodology, and the CBM values, will be reviewed on a seasonal basis.

Big Rivers' CBM is an import quantity that allows generation reliability to be met during an outage of the Wilson generating unit. This represents the outage of the largest generating unit in the Big Rivers control area. The total import requirement for this unit outage is 420 MW. However, most of the 420 MW import is included in TRM. To avoid double counting, only a small portion of the 420 MW import requirement is reserved as CBM.

Big Rivers is a member of the MISO Contingency Reserve Sharing Group (MISO CRSG). This allows Big Rivers to call upon the generation reserves of neighboring systems during generation contingencies. To ensure transmission is available when the MISO CRSG is utilized, TRM is used to reserve transmission for the generation available from the MISO CRSG during a Wilson outage (388 MW). This TRM is treated as a firm reservation (affecting firm and non-firm ATC calculations) for all operating and planning horizons. CBM is used to ensure the full 420 MW can be imported rather than only the 388 MW available from the MISO CRSG.

The total CBM distribution was determined by reviewing the actual sources of replacement generation imported during a previous Wilson outage and modeling similar transfers. The impact of these transfers on each Big Rivers flowgate was then used to determine the CBM values. Additional details regarding the incorporation of CBM into the TTC/ATC calculation process can be found in Big Rivers document PL-MOD-1 AFC-ATC.doc.

Since CBM is based on the loss of the largest unit, the same amount of capacity is required for both the operating and planning horizons. As such, the CBM calculated for the planning horizon is equal to the CBM calculated for the operating horizon. CBM generally does not vary by season. However, a seasonal review/update is completed.

Any generation resources imported to serve BREC control area load will be treated the same as other transmission reservations in the AFC/ATC calculation system. This resource will be included in the power flow cases and ATC calculations. No special considerations will be given for these resources when CBM is calculated.

Generation connected to the Big Rivers system, and allocated for use by BREC control area load, will be included in the power flow models used for AFC/ATC calculations. Other than the CBM and TRM described in this document, no transmission will be held back (via CBM or other means) to ensure the ability to import replacement power.

Generation connected to the Big Rivers system, but not allocated for use by BREC control area load, will be included in the power flow models used for AFC/ATC calculations (to the extent that transmission reservations were made to export this power).

At this time, Big Rivers has no interruptible load. In the future, interruptible load or other special contracts will be handled on a case-by-case basis. Actual contract provisions will likely dictate how the loads are modeled and their impact on CBM. However, in general CBM will not be held for use by interruptible loads.

**CBM Usage Procedure:** The actual use of CBM to import generation resources to supply loads will occur only during emergency conditions. "Emergency conditions" generally means the occurrence of a generation deficiency during times in which no transmission path is available to import the necessary replacement resources. This should normally include an Energy Emergency Alert (EEA Level 1, 2, or 3). Prior to using CBM, all non-firm sales are curtailed. Additionally, interruptible loads are interrupted and other direct-control load management that may exist will be implemented prior to the use of CBM. Close coordination with the TVA RC is required throughout this process.

Big Rivers will generally make all or a portion of the transmission held back as CBM available on an hourly non-firm basis (upcoming 24 hour period only). If CBM is needed for existing native load, the non-firm reservations on the specific will be subject to curtailment following existing procedures.

Any time that CBM is called upon and used, the details of such usage will be posted. This posting will be done within 15 days on Big Rivers' OASIS page under the business practices section. This posting will include the circumstances, duration, and amount of CBM used.

#### **Actual CBM Usages:**

None to-date

**Transmission Reliability Margin (TRM):** TRM is defined as the amount of transfer capability reserved to ensure that the transmission network is secure under a reasonable range of uncertainties in system operating conditions. The Big Rivers TRM is intended to provide an overall reliability margin to account for load forecast/distribution errors, generation variations (balancing uncertainties and dispatch variations), system topology uncertainties, parallel path and simultaneous transfer uncertainties, and other uncertainties. The export TRM (46 MW) applied by Big Rivers is equal to approximately 3% of the expected summer peak load for the Big Rivers control area. This is greater than the 1.5% to 2% per year forecasted growth that is included in the Big Rivers' corporate load forecast. It is also consistent with the extreme weather forecast. The export TRM is more than adequate to meet the MISO CRSG requirement of 32 MW. The TRM procedures and values will be reviewed, and updated if necessary, on a seasonal basis. Additional details regarding the incorporation of TRM into the TTC/ATC calculation process can be found in Big Rivers document PL-MOD-1 AFC-ATC.doc.

#### Export TRM

Export TRM will also allow Big Rivers to meet its MISO CRSG export requirements (up-to 32 MW). Because of this, TRM will not be offered to the market on a non-firm basis.

The total TRM distribution was determined by reviewing actual deliveries to the MISO CRSG and modeling similar transfers. Specific neighboring system generator outages were evaluated as part of this process. The impact of these transfers on each Big Rivers flowgate was then used to determine the TRM values (see PL-MOD-1 AFC-ATC.doc for more details).

#### Import TRM

Import TRM allows Big Rivers to call upon the generation reserves of neighboring systems during generation contingencies. To ensure transmission is available when the MISO CRSG is utilized, TRM is used to reserve transmission for the maximum generation available from the MISO CRSG during a Wilson outage (388 MW). This TRM is treated as a firm reservation (affecting firm and non-firm ATC calculations) for all operating and planning horizons. This 388 MW TRM amount was deemed sufficient to cover the uncertainties described above in the general TRM discussion and the transmission needs during a generator outage. Therefore, the import TRM is based on 388 MW and does not include additional TRM (such as the 3% described above).

CBM				
FLOWGATE		CBM (MW)		CBM (MW)
2100	14COLE 5 161 to 14NATAL5 161	0	14NATAL5 TO 14COLE 5 161	1
2101	14REID 5 161 to 14DAVIS5 161 1	0	14DAVIS5 161 to 14REID 5 161	4
2194	14N.HAR4 138 to 14N.HAR5 161	0	14N.HAR5 161 to 14N.HAR4 138	0
2871	New Hardinsburg to Hardinsburg 138	0	Hardinsburg to New Hardinsburg 138	0
2954	Wilson to Green River 161	0	Green River to Wilson 161	4
2102	14HOPCO5 161 to 5BARKLEY 161 1	0	5BARKLEY 161 to 14HOPCO5 161	5
2423	Hardinsburg to Paradise 161 kV	0	Paradise to Hardinsburg 161 kV	1
2424	BRYAN to MARSHALL 161 KV	1	MARSHALL to BRYAN 161 KV	0
2095	Cloverport to N Hardinsburg 138	0	N Hardinsburg to Cloverport 138	0
2026	10NEWTVL 161 to 14COLE 5 161	5	14COLE 5 161 to 10NEWTVL 161	0
2077	10ABBRWW 138 to 14HENDR4 138 1	7	14HENDR4 138 to 10ABBRWW 138	0
3163	Renshaw to Livingston 161	0	Livingston to Renshaw 161	0
1642	Henderson138 to 161/ Culley-Grandview138 out	7	Henderson161 to 138/ Culley-Grandview138 out	0
2422	NEW HARDINSBG 138 to 161/COLEMN-NATAL 161 out	0	NEW HARDINSBG 161 to 138/COLEMN-NATAL 161 out	0
2420	Coleman to Nat Aluminum 161/Wilson - Green River out	0	Nat Aluminum to Coleman 161/Wilson - Green River out	1
2421	Hopkin Co.to Barkley 161/ Wilson-Green River 161 out	0	Barkley to Hopkin Co.161/Wilson-Green River 161 out	6
2295	A. B. Brown to Henderson 138/Culley-Grandview 138 out	7	Henderson to A. B. Brown 138/Culley-Grandview 138 out	0
3164	Renshaw to Livingston/E. W Frankfort-Shawnee 345 out	0	Livingston to Renshaw/E. W Frankfort-Shawnee 345 out	0
3350	Renshaw to Livingston 161 flo Kelso-Joppa 345	0	Livingston to Renshaw 161 flo Kelso-Joppa 345	0
90089	Wilson to Green River 161 flo Hopkins County to Barkley 161	0	Green River to Wilson 161 flo Hopkins County to Barkley 161	6
90077	McCracken County to Bryan Rd 161 flo Shawnee to Marshall 500	1	Bryan Rd to McCracken County 161 flo Shawnee to Marshall 500	0
90085	Wilson to Green River 161 flo Wilson to Daviess 345	0	Green River to Wilson 161 flo Wilson to Daviess 345	9

TRM				
FLOWGATE		TRM (MW)		TRM (MW)
2100	14COLE 5 161 to 14NATAL5 161	1	14NATAL5 TO 14COLE 5 161	9
2101	14REID 5 161 to 14DAVIS5 161 1	6	14DAVIS5 161 to 14REID 5 161	9
2194	14N.HAR4 138 to 14N.HAR5 161	0	14N.HAR5 161 to 14N.HAR4 138	10
2871	New Hardinsburg to Hardinsburg 138	3	Hardinsburg to New Hardinsburg 138	0
2954	Wilson to Green River 161	44	Green River to Wilson 161	155
2102	14HOPCO5 161 to 5BARKLEY 161 1	3	5BARKLEY 161 to 14HOPCO5 161	25
2423	Hardinsburg to Paradise 161 kV	3	Paradise to Hardinsburg 161 kV	19
2424	BRYAN to MARSHALL 161 KV	2	MARSHALL to BRYAN 161 KV	0
2095	Cloverport to N Hardinsburg 138	0	N Hardinsburg to Cloverport 138	5
2026	10NEWTVL 161 to 14COLE 5 161	51	14COLE 5 161 to 10NEWTVL 161	29
2077	10ABBRWW 138 to 14HENDR4 138 1	21	14HENDR4 138 to 10ABBRWW 138	74
3163	Renshaw to Livingston 161	7	Livingston to Renshaw 161	1
1642	Henderson138 to 161/ Culley-Grandview138 out	23	Henderson161 to 138/ Culley-Grandview138 out	81
2422	NEW HARDINSBG 138 to 161/COLEMN-NATAL 161 out	1	NEW HARDINSBG 161 to 138/COLEMN-NATAL 161 out	16
2420	Coleman to Nat Aluminum 161/Wilson - Green River out	3	Nat Aluminum to Coleman 161/Wilson - Green River out	16
2421	Hopkin Co.to Barkley 161/ Wilson-Green River 161 out	6	Barkley to Hopkin Co.161/Wilson-Green River 161 out	47
2295	A. B. Brown to Henderson 138/Culley-Grandview 138 out	26	Henderson to A. B. Brown 138/Culley-Grandview 138 out	81
3164	Renshaw to Livingston/E. W Frankfort-Shawnee 345 out	8	Livingston to Renshaw/E. W Frankfort-Shawnee 345 out	0
3350	Renshaw to Livingston 161 flo Kelso-Joppa 345	7	Livingston to Renshaw 161 flo Kelso-Joppa 345	1
90089	Wilson to Green River 161 flo Hopkins County to Barkley 161	44	Green River to Wilson 161 flo Hopkins County to Barkley 161	163
90077	McCracken County to Bryan Rd 161 flo Shawnee to Marshall 500	9	Bryan Rd to McCracken County 161 flo Shawnee to Marshall 500	1
90085	Wilson to Green River 161 flo Wilson to Daviess 345	34	Green River to Wilson 161 flo Wilson to Daviess 345	247