TSR LGE-2015-015

(TSR #81599733)

System Impact Study Report

Executive Summary

PROPRIETARY

Version: 1.0

Report Issue Date: November 25, 2015

Report Study Title Posted Date: November 25, 2015

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1. Executive Summary

TranServ has evaluated the Long-Term Firm Network Transmission Service Request (TSR) listed in Table 1-1. A System Impact Study (SIS) was performed to determine the impact of this TSR on the transmission network, to determine if any transmission constraints prohibit granting the requested service and to identify any limiting constraints. This report documents that SIS.

Table 1-1 Request Details

Assign Ref	POR	POD	MW	TS Increment	TS Type	Request Type	Start Time	Stop Time	Q-Time
81599733	MISO	LGEE	12	YEARLY	NEWWORK	ORIGINAL	2016-01-31 23:00:00 CS	2026-12-30 23:00:00 CS	2015-06-26 07:21:08 CS

As shown in Table 1-1, TSR #81599733 (TSR LGE-2015-015) is a yearly network request for 12 MW. It is a profiled load request at a new delivery point.

An Ad Hoc Study Group was formed. Participation in the Ad Hoc Study Group was by invitation to all first-tier Transmission Providers (TP) and/or Transmission Owners (TO) of LG&E and KU.

As given in the Louisville Gas and Electric/Kentucky Utilities (LG&E and KU) TSR Study Criteria Document, posted on the LG&E and KU Open Access Same-Time Information System (OASIS), TSR SISs include both Near-Term Transmission Planning Horizon and Long-Term Transmission Planning Horizon models. The subject TSR was evaluated using 2018 Off Peak, 2018 Summer Peak, 2018 Winter Peak, 2025 Summer Peak, and 2025 Winter Peak power flow models based on the 2017H, 2017S, 2017W, 2025S, and 2025W 2016 Base Case Study (BCS) R20150227 models (2016 BCS models). The TSR LGE-2015-015 models incorporate the 2015 Transmission Expansion Plan (TEP) LG&E and KU system improvements schedule.

All appropriate prior queued transactions were modeled prior to modeling of the subject request. This study included the effect of all earlier queued requests. Representation of these earlier queued requests may also have necessitated the representation of associated planned transmission improvements. Thus, it is important to realize that, if the planned improvements do not come to fruition, the subject request's impact on the transmission system as identified by this study may become invalid and a revised study may become necessary before transmission service can be granted.

The subject request starts within the posted Available Transfer Capability (ATC)/Available Flowgate Capability (AFC)/Available Share of Total Flowgate Capacity (ASTFC) horizons. Thus an OASIS ATC/AFC/ASTFC check was performed.

1.1 Summary of Power flow Analysis Results

1.1.1 Thermal Constraints

No system intact thermal constraints due to the subject request were found.

Table 1-2 summarizes the LG&E and KU contingency thermal constraints to providing the requested service.

Table 1-2
LG&E and KU Thermal Constraints Summary

Year/ Season	Facility	Rating	Pre TSR		Post TSR		DF%
			MVA	%	MVA	%	
2025S	GR RV ST TO PETTIT 69 kV Line	28	14.48	51.71	31.20	111.43	145.39
2025S	E DIAMND TO EARLNG N 69 kV Line	28	13.57	48.46	28.85	103.04	132.87
2025S	EARLNG N TO WALKER 69 kV Line	119	118.80	99.83	122.77	102.77	30.43

It is important to note that only the highest loading results for each contingency of interest for each model/scenario are included in Table 1-2. A more detailed listing of these results can be found in the full report.

No third party thermal constraints due to the subject request were found.

1.1.2 Voltage Constraints

No system intact voltage constraints due to the subject request were found.

Table 1-3 summarizes the LG&E and KU contingency voltage constraints to providing the requested service.

Table 1-3
LG&E and KU Voltage Constraints Summary

Year/ Season	Facility	kV	Pre TSR	Post TSR	Delta Volt %
2018H	E DIAMND	69	0.935	0.879	-5.62%
2018H	ELK C MN	69	0.936	0.880	-5.61%
2018H	ELK CR T	69	0.936	0.880	-5.61%
2018S	E DIAMND	69	0.917	0.860	-5.69%
2018S	ELK C MN	69	0.917	0.861	-5.69%
2018S	ELK CR T	69	0.918	0.861	-5.68%
2018S	HARTSHORNE	69		0.890	
2018S	RUMSEY	69	0.965	0.900	-6.56%
2018S	CALHOUN	69	0.965	0.900	-6.56%
2018S	ASHYBURG	69	0.960	0.900	-6.02%

Year/ Season	Facility	kV	Pre TSR	Post TSR	Delta Volt %
2018W	E DIAMND	69	0.940	0.883	-5.68%
2018W	ELK C MN	69	0.941	0.885	-5.67%
2018W	ELK CR T	69	0.941	0.885	-5.58%
2025S	ASHBY EL	69	0.955	0.894	-6.03%
2025S	ASHYBURG	69	0.948	0.861	-8.72%
2025S	CALHOUN	69	0.945	0.847	-9.85%
2025S	E DIAMND	69	0.914	0.829	-8.47%
2025S	ELK C MN	69	0.914	0.830	-8.43%
2025S	ELK CR T	69	0.915	0.831	-8.45%
2025S	HARTSHORNE	69		0.848	
2025S	ONTON	69	0.950	0.874	-7.61%
2025S	PETTIT	69	0.954	0.899	-5.50%
2025S	RUMSEY	69	0.952	0.871	-8.04%
2025S	SEBREE	69	0.955	0.895	-5.96%
2025W	ASHYBURG	69	0.967	0.884	-8.34%
2025W	CALHOUN	69	0.966	0.872	-9.42%
2025W	E DIAMND	69	0.936	0.855	-8.05%
2025W	ELK C MN	69	0.937	0.857	-8.04%
2025W	ELK CR T	69	0.938	0.857	-8.04%
2025W	HARTSHORNE	69		0.872	
2025W	ONTON	69	0.969	0.896	-7.26%
2025W	PETTIT	69	0.99	0.895	-8.99%
2025W	RUMSEY	69	0.97	0.892	-7.72%

It is important to note that only the worst voltage results for each contingency of interest for each model/scenario are included in Table 1-3. A more detailed listing of these results can be found in the full report.

1.1.3 Flowgate Constraints

No LG&E and KU flowgate constraints due to the subject request were found.

No third party flowgate constraints due to the subject request were found.

1.1.4 ATC/AFC/ASTFC Constraints

No Available Transfer Capability (ATC) or Available Share of Total Flowgate Capacity (ASTFC) constraints due to the subject request were found.

Table 1-4 summarizes the Available Flowgate Capability (AFC) constraint to providing the requested service.

Table 1-4
AFC Constraint Summary

Start Date	Stop Date	Flowgate Number	Flowgate Name	Flowgate Type	Flowgate Owner	CAP	Dir Coeff	PTDF/ OTDF	Impact	Final AFC
7/1/2016	8/1/2016	1024	VOLPHBCONMOS	OTDF	TVA	12	1	0.0711	0.85	-17.85
8/1/2016	9/1/2016	1024	VOLPHBCONMOS	OTDF	TVA	12	1	0.0682	0.82	-8.82
3/1/2017	4/1/2017	1024	VOLPHBCONMOS	OTDF	TVA	12	1	0.0649	0.78	-49.78
4/1/2017	5/1/2017	1024	VOLPHBCONMOS	OTDF	TVA	12	1	0.0662	0.79	-105.79
5/1/2017	6/1/2017	1024	VOLPHBCONMOS	OTDF	TVA	12	1	0.0664	0.8	-102.8

As can be seen in the table above, the OASIS AFC check indicated that there is insufficient AFC on flowgate 01024 VOLPHBCONMOCS for the above listed months of 2016 and 2017. Therefore, the subject request cannot be granted service for those months.

1.2 Conclusion

LG&E and KU thermal and voltage constraints have been identified, as listed in Tables 1-2 and 1-3. These constraints must be addressed by the “Mitigation Needed By” dates shown in Table 1-5 in order to provide the requested service to the TSR-2015-015 request. In addition Third Party AFC constraints have been identified, as listed in Table 1-4. The service cannot be provided from July 01, 2016 to August 31, 2016 and from March 01, 2017 to May 31, 2017.

Table 1-5

LG&E and KU Mitigation Needed by and Estimated Mitigation Dates Facility to Mitigate	Mitigation Needed By	Estimate Mitigation Date	Mitigation
EARLNG N TO WALKER 69	**2024S**	**2024S**	MOT Upgrade of 0.2 mi of 1272 ACSR
GR RV ST TO PETTIT 69	**2019S**	**2019S**	Reconductor of 3.03 mi of 1F 6x1 CCW and MOT Upgrade of 6 mi of 397.5 ACSR
E DIAMND TO EARLNG N 69	**2020S**	**2020S**	MOT Upgrade of 5.18 mi of 397.5 ACSR
ASHBY EL	**2020S**	**2018S**	Capacitor at new tap point or new station (so switches with load during restoration). Includes possible purchase of property
ASHYBURG	**2019S**		
CALHOUN	**2018S**		
E DIAMND	**2018S**		
ELK C MN	**2018S**		
ELK CR T	**2018S**		
HARTSHORNE	**2018S**		
ONTON	**2019S**		
PETTIT	**2025S**		
RUMSEY	**2018S**		
SEBREE	**2020S**		

As can be seen in Table 1-2, the loading on the Earlington North – Walker, Earlington North – East Diamond and Green River Steel – Pettit 69 kV lines load beyond acceptable levels and will require mitigation. As can be seen in Table 1-3, the voltage at several 69 kV buses drops below acceptable levels and will require mitigation. As can be seen in Table 1-5, the estimated mitigation dates shown are coincident with or prior to the mitigation needed dates.

LG&E/KU's non-binding planning level cost estimate to mitigate the thermal and voltage constraints is **$8,084,000 USD**. LG&E/KU has determined that direct assignment facilities are required for this request. The non-binding good faith cost estimate for the direct assignment facilities is **$385,000 USD**. A detailed non-binding planning level cost estimate is given in Section 8 of the full report.

The cost estimate will be further refined in the Facilities Study.

It is also important for the customer to realize that due to the AFC constraint shown in Table 1-4, this service cannot be granted from July 01, 2016 to August 31, 2016 and from March 1, 2017 to May 31, 2017.

The full report is available on LG&E and KU CEII FTP site. See study report title posting on OASIS for instructions for accessing LG&E and KU CEII FTP site. LG&E and KU secure CEII FTP site URL is: https://eft.lge-ku.com/EFTClient/Account/Login.htm