

Impact Cluster Study for Generation Interconnection Requests

Southwest Power Pool
Engineering Department
Generation Interconnection Studies

(ICS-2008-001-2)
ReStudy #2
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SPP RESTRICTED

Executive Summary

Southwest Power Pool has conducted this Impact Re-Study for certain generation interconnection requests in the SPP Generation Interconnection Queue to account for interconnection requests that have withdrawn from the interconnection queue since the Facility Cluster Study (FCS-2008-001) was posted. These interconnection requests have been clustered together for the following Impact Cluster Study. This Impact Cluster Study analyzes the interconnecting of multiple generation interconnection requests associated with new generation totaling 5,851 MW of new generation which would be located within the transmission systems of Mid-Kansas Electric Power LLC (MKEC), Oklahoma Gas and Electric (OKGE), Southwestern Public Service (SPS), Sunflower Electric Power Corporation (SUNC), Westar Energy (WERE) and/or Western Farmers Electric Cooperative (WFEC). The various generation interconnection requests have differing proposed in-service dates¹. The generation interconnection requests included in this Impact Cluster Study are listed in Appendix A by their queue number, amount, area, requested interconnection point, proposed interconnection point, and the requested in-service date.

Power flow analysis has indicated that for the powerflow cases studied, 5,851 MW of nameplate generation may be interconnected with transmission system reinforcements within the SPP transmission system.

Changes from the ICS-2008-001-1 restudy include the following

- Withdrawal of GEN-2007-008
- Withdrawal of GEN-2007-045
- Removal of the following shared upgrades
 - Conway – Wheeler 345kV
 - Conway 345/115kV autotransformer
 - Wheeler – Anadarko 345kV
 - Wheeler 345/230kV autotransformer
 - Grapevine 230/115kV autotransformer replacement

A limited dynamic stability analysis was performed for this restudy. The study models were adjusted to reflect the changes listed above and a limited number of 345kV outages were simulated to determine that transmission system stability would be maintained. The power factor analysis was not performed again. Dynamic Stability Analysis has determined that the transmission system will remain stable with the assigned Network Upgrades and Interconnection Facilities to the Impact Cluster Study Generation Interconnection Customers. Q-V analysis determined that the Gray County – Stevens County 345kV transmission line is still required for the outage of the Hitchland – Finney 345kV transmission line.

The need for reactive compensation in accordance with Order No. 661-A for wind farm interconnection requests and those requirements were determined in the previous Impact Study ICS-2008-001-1 and those results still apply.

¹ The generation interconnection requests in-service dates will need to be deferred based on the required lead time for the Network Upgrades necessary. The Interconnection Customer's that proceed to the Facility Study will be provided a new in-service date based on the completion of the Facility Study.

The total estimated minimum cost for interconnecting the studied generation interconnection request is \$490,000,000. These costs are shown in Appendix E and F. These costs do not include the Interconnection Customer Interconnection Facilities as defined by the SPP Open Access Transmission Tariff (OATT). This cost does not include additional network constraints in the SPP transmission system that were identified are shown in Appendix I.

Network Constraints listed in Appendix I are in the local area of the new generation when this generation is injected throughout the SPP footprint for the Energy Resource (ER) Interconnection Request. Additional Network constraints will have to be verified with a Transmission Service Request (TSR) and associated studies. With a defined source and sink in a TSR, this list of Network Constraints will be refined and expanded to account for all Network Upgrade requirements.

The required interconnection costs listed in Appendix E and F do not include all costs associated with the deliverability of the energy to final customers. These costs are determined by separate studies if the Customer submits a Transmission Service Request through SPP's Open Access Same Time Information System (OASIS) as required by Attachment Z1 of the SPP OATT.

Based on the SPP Tariff Attachment O, transmission facilities that are part of the SPP Transmission Expansion Plan (STEP) including Sponsored Economic Upgrades or the Balanced Portfolio that may be approved by the SPP Board of Directors will receive notifications to construct. These projects will then be considered construction pending projects and would not be assignable to the Impact Cluster Study Generation Interconnection Requests.

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Introduction

Generation Interconnection Requests in the Southwest Power Pool (SPP) Generation Interconnection Queue have been clustered together for the following Impact Cluster Study. This Impact Cluster Study analyzes multiple generation interconnection requests associated with new generation totaling 5,851 MW which would be located within the transmission systems of Missouri Public Service (MIPU), Mid-Kansas Electric Power LLC (MKEC), Oklahoma Gas and Electric (OKGE), Southwestern Public Service (SPS), Sunflower Electric Power Corporation (SUNC), Westar Energy (WERE) and/or Western Farmers Electric Cooperative (WFEC). The various generation interconnection requests have differing proposed in-service dates. The generation interconnection requests included in this Impact Cluster Study are listed in Appendix A by their queue number, amount, area, requested interconnection point, proposed interconnection point, and the requested in-service date.

The primary objective of this Impact Cluster Study is to identify the system constraints associated with connecting the generation to the area transmission system. The Impact and other subsequent Interconnection Studies are designed to identify attachment facilities, Network Upgrades and other Direct Assignment Facilities needed to accept power into the grid at each specific interconnection receipt point.

Model Development

Interconnection Requests Included in the Cluster

SPP has included certain interconnection requests to be analyzed in this cluster study. The interconnection requests are listed in Appendix A.

All interconnection requests that were included in Impact Cluster Re-Study (ICS-2008-001-1) posted January 12, 2010 with the exception of the following two withdrawals

- GEN-2007-008
- GEN-2007-045

Previous Queued Projects

The previous queued projects included in this study are listed in Appendix B. In addition to the Base Case Upgrades, the previous queued projects were assumed to be in-service and added to the Base Case models. These projects were dispatched as Energy Resources (ERIS) with equal distribution across the SPP footprint.

Development of Base Cases

Powerflow - The 2009 series Transmission Service Request (TSR) Models 2010 spring and 2014 summer and winter peak scenario 0 peak cases were used for this study. After the 2010 spring and the 2014 summer peak cases were developed, each of the control areas' resources were then re-dispatched using current dispatch orders.

Stability – The 2009 series SPP Model Development Working Group (MDWG) Models 2010 winter and 2010 summer were used for this study.

Base Case Upgrades

The following facilities have been previously assigned or are in construction stages and were assumed to be in-service at the time of dispatch and added to the base case models.

- Woodward – Northwest 345kV line and associated upgrades to be built by OKGE for 2009 in-service².
- Hitchland 345/230/115kV upgrades to be built by SPS for 2010/2011 in-service³.
 - Hitchland – Pringle 230kV line
 - Hitchland – Moore County 230kV line
 - Hitchland – Ochiltree 230kV line
 - Hitchland – Texas County 115kV line
 - Hitchland – Hansford County 115kV line
 - Hitchland – Sherman County Tap 115kV line
- Valliant – Hugo – Sunnyside 345kV – assigned to Aggregate Study AG3-2006 Customers for 2011 in-service
- Wichita – Reno County – Summit 345kV to be built by WERE for 2011 in-service⁴.
- Rose Hill – Sooner 345kV to be built by WERE/OKGE for 2010 in-service.
- Finney – Holcomb 345kV Ckt #2 line assigned to GEN-2006-044 interconnection customer for possible 2010 in-service⁵.
- Hitchland – Woodward 345kV line assigned to GEN-2006-049 interconnection customer for in service date yet to be determined
- Tuco – Woodward 345kV line approved by the SPP Board of Directors as part of the Balanced Portfolio and issued an NTC in June, 2009
- Spearville – Knoll- Axtell 345kV line approved by the SPP Board of Directors as part of the Balanced Portfolio and issued an NTC in June, 2009

Effect of Hitchland-Woodward 345kV upon the Study Interconnection Requests

An analysis has been performed without the Hitchland-Woodward 345kV transmission line to determine which of the study requests are dependent upon the higher queued project GEN-2006-049 funding this particular upgrade.

Potential Upgrades Not in the Base Case

Any potential upgrades that do not have a Notification to Construct (NTC) have not been included in the base case. These upgrades include any identified in the SPP Extra-High Voltage (EHV) overlay plan or any other SPP planning study other than the upgrades listed above in the previous section.

Regional Groupings

² Approved based on an order of the Corporation Commission of the State of Oklahoma, Cause No. PUD 200800148 Order No. 55935

³ Approved 230kV upgrades are based on SPP 2007 STEP. Upgrades may need to be re-evaluated in the system impact study.

⁴ Approved based on an order of the Kansas Corporation Commission issued in Docket no. 07-WSEE-715-MIS

⁵ Based on Facility Study Posting November 2008

The interconnection requests listed in Appendix A were grouped together in eight different regional groups based on geographical and electrical impacts. These groupings are shown in Appendix C.

To determine interconnection impacts, eight different dispatch variations of the spring base case models were developed to accommodate the regional groupings.

Powerflow - For each group, the various wind generating plants were modeled at 80% nameplate of maximum generation. The wind generating plants in the other areas were modeled at 20% nameplate of maximum generation. This process created eight different scenarios with each group being studied at 80% nameplate rating. These projects were dispatched as Energy Resources with equal distribution across the SPP footprint. This method allowed for the identification of network constraints that were common to the regional groupings that could then in turn have the mitigating upgrade cost allocated throughout the entire cluster.

Peaking units were not dispatched in the 2010 spring model. To study peaking units' impacts, the 2014 summer peak model was chosen and peaking units were modeled at 100% of the nameplate rating and wind generating facilities were modeled at 10% of the nameplate rating.

Stability - For each group, all interconnection requests (wind and non-wind) were modeled at 100% nameplate of maximum generation in both winter and summer seasonal models. The wind generation interconnection requests in the other areas were modeled at 20% nameplate of maximum generation while fossil units were modeled at 100% in the other areas. This process created eight different scenarios with each group being studied at 100% nameplate rating. These projects were dispatched as Energy Resources with equal distribution across the SPP footprint.

Identification of Network Constraints

The initial set of network constraints were found by using PTI MUST First Contingency Incremental Transfer Capability (FCITC) analysis on the entire cluster grouping dispatched at the various levels mentioned above. An additional FCITC analysis was conducted for each interconnection request individually at 100% nameplate. These constraints were then screened to determine if any of the generation interconnection requests had at least a 20% Distribution Factor (DF) upon the constraint. Constraints that measured at least a 20% DF from at least one interconnection request were considered for mitigation.

Determination of Cost Allocated Network Upgrades

Cost Allocated Network Upgrades of wind generation interconnection requests were determined using the 2010 spring model. Cost Allocated Network Upgrades of peaking units was determined using the 2014 summer peak model. Once a determination of the required Network Upgrades was made, a powerflow model of the 2010 spring case was developed with all cost allocated Network Upgrades in-service. A MUST FCITC analysis was performed to determine the Power Transfer Distribution Factors (PTDF), defined as a distribution factor with system intact conditions that each generation interconnection request had on each new upgrade. The impact each generation interconnection request had on each upgrade project was weighted by the size of each request. Finally the costs due by each request for a particular project were then determined by allocating the portion of each request's impact over the impact of all affecting requests.

For example, assume that there are three Generation Interconnection requests, X, Y, and Z that are responsible for the costs of Upgrade Project '1'. Given that their respective PTDF for the project have been determined, the cost allocation for Generation Interconnection request 'X' for Upgrade Project 1 is found by the following set of steps and formulas:

- Determine an Impact Factor on a given project for all responsible GI requests:

$$\text{Request X Impact Factor on Upgrade Project 1} = \text{PTDF\%}(X) * \text{MW}(X) = X1$$

$$\text{Request Y Impact Factor on Upgrade Project 1} = \text{PTDF\%}(Y) * \text{MW}(Y) = Y1$$

$$\text{Request Z Impact Factor on Upgrade Project 1} = \text{PTDF\%}(Z) * \text{MW}(Z) = Z1$$

- Determine each request's Allocation of Cost for that particular project:

$$\text{Request X's Project 1 Cost Allocation (\$)} = \frac{\text{Network Upgrade Project 1 Cost}(\$) * X1}{X1 + Y1 + Z1}$$

- Repeat previous for each responsible GI request for each Project

The cost allocation of each needed Network Upgrade is determined by the size of each request and its impact on the given project. This allows for the most efficient and reasonable mechanism for sharing the costs of upgrades.

Credits for Amounts Advanced for Network Upgrades

Interconnection Customer shall be entitled to credits in accordance with Attachment Z1 of the SPP Tariff for any Network Upgrades including any tax gross-up or any other tax-related payments associated with the Network Upgrades, and not refunded to the Interconnection Customer.

Interconnection Facilities

The requirement to interconnect the 5,851 MW of generation into the existing and proposed transmission systems in the affected areas of the SPP transmission footprint consist of the necessary cost allocated shared facilities listed in Appendix G. Interconnection Facilities specific to each generation interconnection request are listed in Appendix F. Appendix G lists the costs by upgrade. The total for interconnection facilities owned by transmission owners and network upgrades is approximately \$490,000,000.

Other Network Constraints in the AEPW, MIDW, OKGE, SPS, SUNC, SWPA, MKEC, WERE, AND WFEC transmission systems that were identified are shown in Appendix I. With a defined source and sink in a TSR, this list of Network Constraints will be refined and expanded to account for all Network Upgrade requirements.

A preliminary one-line drawing for each generation interconnection request are listed in Appendix D. Figure 1 depicts the major transmission line Network Upgrades needed to support the interconnection of the generation amounts requested in this study.

Powerflow

Powerflow Analysis Methodology

The Southwest Power Pool (SPP) Criteria states that:

“The transmission system of the SPP region shall be planned and constructed so that the contingencies as set forth in the Criteria will meet the applicable NERC Reliability Standards for transmission planning. All MDWG power flow models shall be tested to verify compliance with the System Performance Standards from NERC Table 1 – Category A.”

The ACCC function of PSS/E was used to simulate single contingencies in portions or all of the modeled control areas of AEPW, EMDE, Grand River Dam Authority (GRDA), Kansas City Power & Light (KCPL), MIDW, MIPU, OKGE, SPS, SUNC, WERE, WFEC and other control areas were applied and the resulting scenarios analyzed. This satisfies the “more probable” contingency testing criteria mandated by NERC and the SPP criteria.

Powerflow Analysis

A powerflow analysis was conducted for each Interconnection Customer's facility using modified versions of the 2010 spring peak and the 2014 summer peak models. The output of the Interconnection Customer's facility was offset in each model by a reduction in output of existing online SPP generation. This method allows the request to be studied as an Energy Resource (ERIS) Interconnection Request. The available seasonal models used were through the 2014 Summer Peak.

This analysis was conducted assuming that previous queued requests in the immediate area of these interconnect requests were in-service. The analysis of the each Customer's project indicates that additional criteria violations will occur on the AEPW, MIDW, OKGE, SPS, SUNC, SWPA, MKEC, WERE, AND WFEC transmission systems under steady state and contingency conditions in the peak seasons.

Cluster Group 1 (Woodward Area)

The Woodward area contained approximately 2,338 MW of new interconnection requests in addition to the 739MW of prior queued interconnection requests. The Woodward – Hitchland 345kV and Woodward-Tuco 345kV lines were added to the model to study this area. West to east flows showed constraints in the area as the proposed Woodward – Northwest 345kV line, and the 138kV line from Woodward to Mooreland. To mitigate these constraints, a 345kV line north to Wichita via Comanche was modeled. In addition, the 138kV line from Woodward to Mooreland was modeled as being reconducted to alleviate constraints that were impacted by the Woodward group.

Cluster Group 2 (Hitchland Area)

The Hitchland area contained 435 MW of interconnection request in addition to the 1,958 MW of previous queued generation interconnection requests. The Hitchland – Woodward 345kV line was added to the models to study this area as it has been assigned to GEN-2006-049 Interconnection Customer. With these upgrades, overloads on the Woodward-Northwest 345kV line as well as the underlying 138kV lines out of Woodward. Also, as discussed in the stability section, even with the addition of Hitchland-Woodward 345kV, the loss of the Stevens County – Finney 345kV transmission line may cause voltage collapse at the Hitchland 345kV bus. The mitigation for this issue is a new 345kV line identified in the initial Impact Study as a Gray County – Stevens County 345kV line.

Dependency upon Hitchland-Woodward 345kV – Powerflow analysis without the Hitchland-Woodward 345kV line shows that all interconnection requests in Group 2 are dependent upon this upgrade being built. Should GEN-2006-049 withdraw, a restudy will be required to determine the cost allocation of this transmission line.

Cluster Group 3 (Spearville Area)

The Spearville area contained 1,110 MW of interconnection requests and 660 MW of previous queued interconnection requests. The Spearville-Knoll-Axtell 345kV line was modeled for this area. The major constraints caused by the Spearville area cluster included the Spearville – Mullergren 230kV line, the Circle – Mullergren 230kV line, and the Spearville 345/230kV transformer. To mitigate these constraints, a line to Wichita via Comanche substation was modeled at 345kV. Also, the Spearville 345/230kV autotransformer was shown as overloading due to too much requested generation at the Spearville 230kV bus and a second autotransformer was modeled.

Cluster Group 4 (Mingo/NW Kansas Group)

The Mingo/NW Kansas group had 300 MW in addition to the 715 MW of previously queued generation in the area. This interconnection request also impacted the Spearville – Mullergren 230kV line as well as the Spearville 345/230kV autotransformer. As such, the Spearville – Comanche – Wichita 345kV line was modeled.

Cluster Group 5 (Amarillo Area)

The Amarillo group was revised to contain 400 MW of interconnection requests in addition to the 1,506 MW of previously queued interconnection requests in this area. With no upgrades added, the Woodward – Northwest 345kV line is a constraint. The Hitchland-Woodward 345kV line and Stevens-Gray 345kV line is necessary to avoid voltage collapse for outage of Stevens – Finney 345kV

Dependency upon Hitchland-Woodward 345kV – Powerflow analysis without the Hitchland-Woodward 345kV line shows that all interconnection requests in Group 5 are dependent upon this upgrade being built. Should GEN-2006-049 withdraw, a restudy will be required to determine the cost allocation of this transmission line.

Cluster Group 6 (South Panhandle/New Mexico)

This group had 668 MW of interconnection requests in addition to the 570 MW of previously queued interconnection requests. The Tuco-Woodward 345kV line was modeled for this area. However, this group was still shown to impact overloaded facilities such as the Woodward-Northwest 345kV line and the Grapevine – Elk City 230kV corridor. To alleviate these impacts, the Wheeler County – Anadarko 345kV line was assigned to these interconnection requests.

Dependency upon Hitchland-Woodward 345kV – Powerflow analysis without the Hitchland-Woodward 345kV line shows that all interconnection requests in Group 5 are dependent upon this upgrade being built. Should GEN-2006-049 withdraw, a restudy will be required to determine the cost allocation of this transmission line.

Cluster Group 7 (Southwestern Oklahoma)

This group had 600 MW of interconnection requests in addition to the 947 MW of previous queued generation in the area. With the reduction of queued generation to the west of this area, no constraints were found in this area with the exception of some local issues.

Cluster Group 8 (South Central Kansas)

GEN-2007-025 had been grouped in the Spearville group in the Facility Study. For the Impact Study, GEN-2007-025 was broken out of Group 3 due to its geographical distance from the Kansas – The GEN-2007-025 Customer initially chose to interconnect to the Wichita – Woodring 345kV line. SPP changed the point of interconnection to the Comanche-Wichita 345kV line as this line routing was closer to the generating facility. Going into the restudy, the Customer again requested to be interconnected to the Wichita-Woodring 345kV line. No constraints were found with this configuration.

Stability Analysis

A limited stability analysis was conducted for each Interconnection Customer's facility using modified versions of the 2010 winter peak and the 2010 summer peak models. The stability analysis was conducted with all upgrades in service that were identified in the powerflow analysis. For each group, the interconnection requests were studied at 100% nameplate output while the other groups were dispatched at 20% output for wind requests and 100% output for fossil requests. The output of the Interconnection Customer's facility was offset in each model by a reduction in output of existing online SPP generation. The following synopsis is included for each group.

The following faults were run for Groups 1, 2, 5, 6, and 7

1. 3 phase fault at the Tuco-Woodward 345kV midpoint bus. Trip and lockout out Tuco-Woodward 345kV
2. 3 phase fault at Woodward 345kV bus. Trip and lockout out Tuco-Woodward 345kV
3. 3 phase fault at Tuco 345kV bus. Trip and lockout out Tuco-Woodward 345kV
4. 3 phase fault at Hitchland 345kV bus. Trip and lockout out Hitchland-Woodward 345kV
5. 3 phase fault at Woodward 345kV bus. Trip and lockout out Hitchland-Woodward 345kV
6. 3 phase fault at Finney 345kV bus. Trip and lockout out Finney – Stevens County 345kV
7. 3 phase fault at Stevens County 345kV bus. Trip and lockout out Finney – Stevens County 345kV
8. 3 phase fault at Stevens County 345kV bus. Trip and lockout out Stevens County – Gray County 345kV
9. 3 phase fault at Gray County 345kV bus. Trip and lockout out Stevens County – Gray County 345kV
10. 3 phase fault at Medicine Lodge 345kV bus. Trip and lockout Medicine Lodge – Wichita 345kV
11. 3 phase fault at Wichita 345kV bus. Trip and lockout Medicine Lodge – Wichita 345kV
12. 3 phase fault at Tatonga 345kV bus. Trip and lockout out Tatonga – Northwest 345kV
13. 3 phase fault at Northwest 345kV bus. Trip and lockout out Tatonga – Northwest 345kV

Cluster Group 1 (Woodward Area)

Power Factor and LVRT analysis from ICS-2008-001-1 posted January, 2010 still applies. Transmission system was found to be stable with all network upgrades in service.

Cluster Group 2 (Hitchland Area)

Power Factor and LVRT analysis from ICS-2008-001-1 posted January, 2010 still applies. Transmission system was found to be stable with all network upgrades (including Gray – Stevens County 345kV) in service. As discussed earlier, voltage collapse was observed at Hitchland for the loss of the Stevens County – Finney 345kV transmission line. A new line was modeled from Stevens County to Gray County Kansas to a point on the Spearville – Holcomb 345kV line.

Cluster Group 3 (Spearville Area)

Power Factor and LVRT analysis from ICS-2008-001-1 posted January, 2010 still applies. No additional simulation were run in this area.

Cluster Group 4 (Mingo Area)

Power Factor and LVRT analysis from ICS-2008-001-1 posted January, 2010 still applies. No additional simulation were run in this area.

Cluster Group 5 (Amarillo Area)

Power Factor and LVRT analysis from ICS-2008-001-1 posted January, 2010 still applies. Transmission system was found to be stable with all network upgrades in service.

Cluster Group 6 (South Panhandle Area)

Power Factor and LVRT analysis from ICS-2008-001-1 posted January, 2010 still applies. Transmission system was found to be stable with all network upgrades in service.

Cluster Group 7 (Southwest Oklahoma)

Power Factor and LVRT analysis from ICS-2008-001-1 posted January, 2010 still applies. Transmission system was found to be stable with all network upgrades in service.

Cluster Group 8 (South Central Kansas)

Power Factor and LVRT analysis from ICS-2008-001-1 posted January, 2010 still applies. No additional simulations were run in this area.

Regional Map with Proposed Upgrades

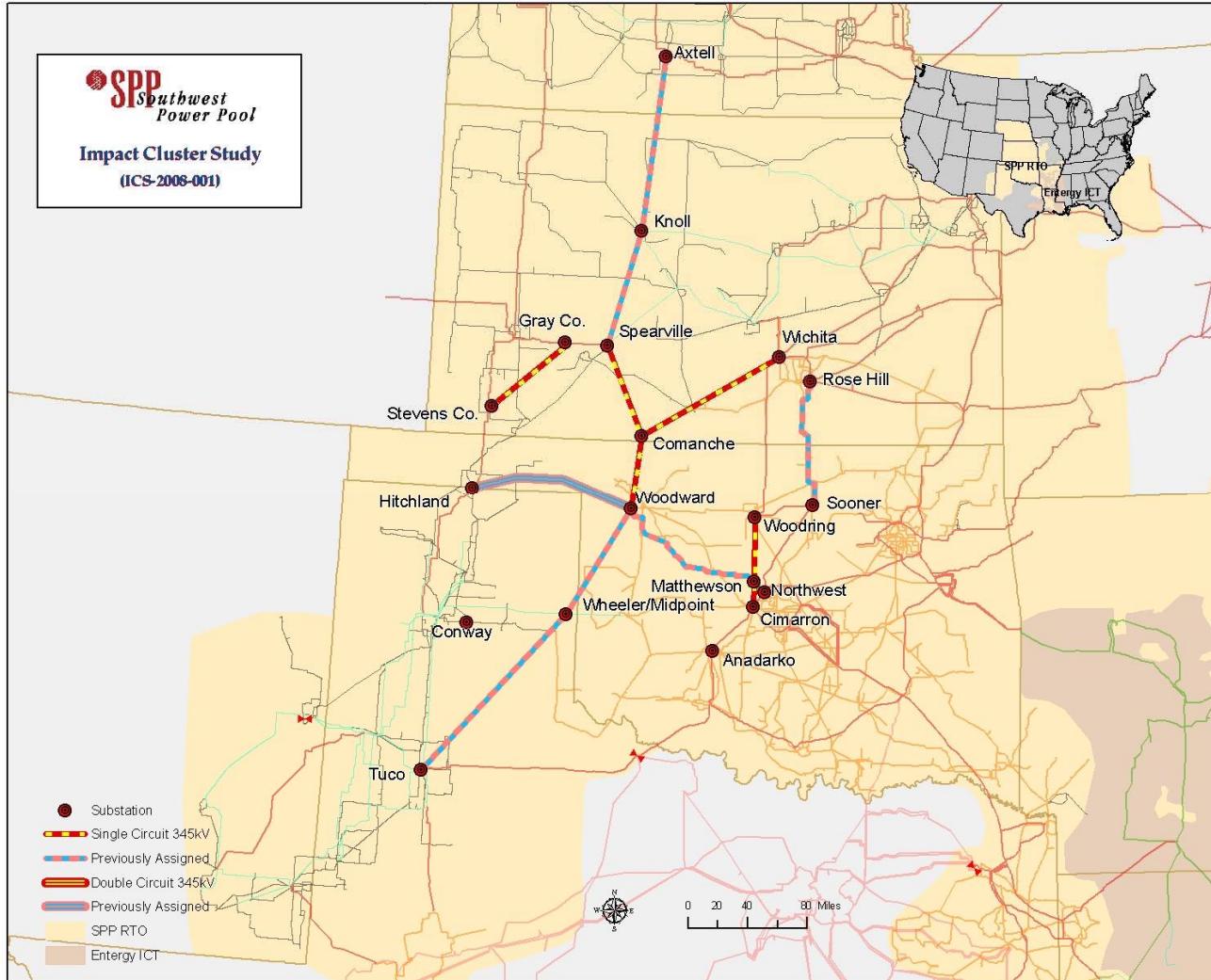


Figure 1 - Proposed Major Line Upgrades

Conclusion

The minimum cost of interconnecting all of the interconnection requests included in this Impact Cluster Study is estimated at \$490,000,000 for the Allocated Network Upgrades and Transmission Owner Interconnection Facilities are listed in Appendix E and F. These costs do not include the cost of upgrades of other transmission facilities listed in Appendix I which are Network Constraints.

The required interconnection costs listed in Appendices E, and F, and other upgrades associated with Network Constraints do not include all costs associated with the deliverability of the energy to final customers. These costs are determined by separate studies if the Customer submits a Transmission Service Request (TSR) through SPP's Open Access Same Time Information System (OASIS) as required by Attachment Z1 of the SPP Open Access Transmission Tariff (OATT).

Appendix

A: Generation Interconnection Requests Considered for Impact Study

Request	Amount	Area	Requested Point of Interconnection	Proposed Point of Interconnection	Requested In-Service Date
GEN-2006-006	205	MKEC	Spearville 230kV	Spearville 230kV	12/31/2010
GEN-2007-005	200	SPS	Pringle 115kV	Pringle 115kV	12/1/2008
GEN-2007-021	201	OKGE	Dewey 138kV	*Tatonga 345kV	8/1/2009
GEN-2007-025	300	WERE	Wichita – Woodring 345kV	* Wichita – Woodring 345kV	10/1/2009
GEN-2007-032	150	WFEC	Clinton Junction - Clinton 138kV	Clinton Junction - Clinton 138kV	12/31/2010
GEN-2007-034	150	SPS	Tolk - Eddy County 345kV	Tolk - Eddy County 345kV	8/15/2010
GEN-2007-038	200	SUNC	Spearville 345kV	Spearville 345kV	12/31/2012
GEN-2007-043	300	AEPW	Lawton Eastside - Cimarron 345kV	Lawton Eastside - Cimarron 345kV	12/1/2009
GEN-2007-044	300	OKGE	Roman Nose 138kV	*Tatonga 345kV	12/1/2009
GEN-2007-046	200	SPS	Texas County - *Hitchland 115kV	*Hitchland 115kV	12/31/2011
GEN-2007-048	400	SPS	Amarillo South - Swisher County 230kV	Amarillo South - Swisher County 230kV	11/1/2009
GEN-2007-050	171	OKGE	Woodward 138kV	Woodward EHV 138kV	10/1/2009
GEN-2007-051	200	WFEC	Mooreland 138kV	Mooreland 138kV	11/7/2007
GEN-2007-052	150	WFEC	Anadarko 138kV	Anadarko 138kV	5/1/2008
GEN-2007-057	35	SPS	Valero 115kV	Moore County East 115kV	5/1/2009
GEN-2007-062	765	OKGE	*Woodward 345kV	*Woodward 345kV	12/31/2011
GEN-2008-003	101	OKGE	Woodward 138kV	*Woodward EHV 138kV	8/31/2009
GEN-2008-008	60	SPS	Graham 69kV	Graham 69kV	12/31/2010
GEN-2008-009	60	SPS	San Juan Mesa 230kV	San Juan Mesa 230kV	3/1/2012
GEN-2008-013	300	OKGE	Wichita – Woodring 345kV	Wichita - Woodring 345kV	10/1/2010
GEN-2008-014	150	SPS	TUCO - Oklaunion 345kV	TUCO - Oklaunion 345kV	12/1/2010
GEN-2008-016	248	SPS	Grassland 230kV	Grassland 230kV	12/1/2009
GEN-2008-017	300	SUNC	Setab 345kV	Setab 345kV	3/1/2012
GEN-2008-018	405	SUNC	Holcomb - Spearville 345kV	Finney 345kV	12/31/2012
GEN-2008-019	300	OKGE	Dewey 138kV	*Tatonga 345kV	12/31/2012
GROUPED TOTAL	5,851				

* Planned Facility

^ Proposed Facility

*** Electrically Remote Interconnection Requests

B: Prior Queued Interconnection Requests

Request	Amount	Area	Requested/Proposed Point of Interconnection	Status or In-Service Date
GEN-2001-014	96	WFEC	Fort Supply 138kV	On-Line
GEN-2001-026	74	WFEC	Washita 138kV	On-Line
GEN-2001-033	180	SPS	San Juan Mesa Tap 230kV	On-Line
GEN-2001-036	80	SPS	Caprock Tap 115kV	On-Line
GEN-2001-037	103	OKGE	Windfarm Switching 138kV	On-Line
GEN-2001-039A	105	MKEC	Greensburg - Judson-Large 115kV	On Schedule for 2011
GEN-2001-039M	100	SUNC	Leoti - City Services 115kV	On-Line
GEN-2002-005	120	WFEC	Morewood - Elk City 138kV	On-Line
GEN-2002-006	150	SPS	Texas County 115kV	IA Executed/On Schedule 12/31/2010
GEN-2002-008	240	SPS	*Hitchland 345kV	On-Line at 120MW
GEN-2002-009	80	SPS	Hansford County 115kV	On-Line
GEN-2002-022	240	SPS	Bushland 230kV	On-Line at 160MW
GEN-2002-025A	150	MKEC	Spearville 230kV	On-Line at 100MW on schedule for 150 MW for 2010
GEN-2003-004	100	WFEC	Washita 138kV	On-Line
GEN-2003-005	100	WFEC	Anadarko - Paradise 138kV	On Line
GEN-2003-013**	198	SPS	*Hitchland - Finney 345kV	On Schedule for 2012
GEN-2003-020	160	SPS	Carson County 115kV	On-Line at 80MW
GEN-2003-022	120	AEPW	Washita 138kV	On-Line
GEN-2004-003	140	SPS	Conway 115kV	On Schedule for 2011
GEN-2004-014	155	MKEC	Spearville 230kV	On Schedule for 2011
GEN-2004-020	27	AEPW	Washita 138kV	On-Line
GEN-2004-023	21	WFEC	Washita 138kV	On-Line
GEN-2005-003	31	WFEC	Washita 138kV	On-Line
GEN-2005-008	120	OKGE	Woodward 138kV	On-Line
GEN-2005-010	160	SPS	Roosevelt County - Tolk West 230kV (Single Ckt Tap)	On Suspension
GEN-2005-012	250	SUNC	Spearville 345kV	On Suspension
GEN-2005-015	150	SPS	Tuco - Oklaunion 345kV	On Suspension
GEN-2005-017	340	SPS	*Hitchland - Potter County 345kV	On Suspension
GEN-2005-021	86	SPS	Kirby 115kV	On Suspension
GEN-2006-002	150	AEPW	Grapevine - Elk City 230kV	On Suspension
GEN-2006-020	20	SPS	*Hitchland - Sherman County Tap	IA Executed/On Schedule 12/31/2010
GEN-2006-032	200	MIDW	South Hays 230kV	On Suspension
GEN-2006-034	81	SUNC	Kanarado - Sharon Springs 115kV	On Suspension
GEN-2006-035	225	AEPW	Grapevine - Elk City 230kV	On Suspension
GEN-2006-039	400	SPS	Tap and Tie both Potter County - Plant X 230kV and Bushland - Deaf Smith 230kV	On Suspension
GEN-2006-040	100	SUNC	Mingo 115kV	On Suspension
GEN-2006-043	99	AEPW	Grapevine - Elk City 230kV	On-Line
GEN-2006-044	370	SPS	*Hitchland 345kV	On Suspension
GEN-2006-045	240	SPS	Tap and Tie both Potter County - Plant X 230kV and Bushland - Deaf Smith 230kV	On Suspension
GEN-2006-046	130	OKGE	Dewey 138kV	On Schedule for 2010
GEN-2006-047	240	SPS	Tap and Tie both Potter County - Plant X 230kV and Bushland - Deaf Smith 230kV	On Schedule for 2013
GEN-2006-049	400	SPS	*Hitchland - Finney 345kV	IA Pending

Appendix C: Study Groupings



Request	Amount	Area	Requested/Proposed Point of Interconnection	Status or In-Service Date
GEN-2007-002	160	SPS	Grapevine 115kV	On Suspension
GEN-2007-006	160	OKGE	Roman Nose 138kV	On Suspension
GEN-2007-011	135	SUNC	Syracuse 115kV	On Schedule
GEN-2007-013	99	SUNC	Selkirk 115kV	On Schedule
GROUPED TOTAL	7,085			

* Planned Facility

C: Study Groupings

Cluster	Request	Amount	Area	Proposed Point of Interconnection
Prior Queued	GEN-2001-014	96	WFEC	Fort Supply 138kV
	GEN-2001-037	103	OKGE	Windfarm Switching 138kV
	GEN-2002-005	120	WFEC	Morewood - Elk City 138kV
	GEN-2005-008	130	OKGE	Woodward 138kV
	GEN-2006-046	130	OKGE	Dewey 138kV
	GEN-2007-006	160	OKGE	Roman Nose 138kV
PRIOR QUEUED SUBTOTAL		739		
Cluster	Request	Amount	Area	Proposed Point of Interconnection
Woodward	GEN-2007-021	201	OKGE	*Tatonga 345kV
	GEN-2007-044	300	OKGE	*Tatonga 345kV
	GEN-2007-050	200	OKGE	*Woodward 138kV
	GEN-2007-051	171	WFEC	Mooreland 138kV
	GEN-2007-062	765	OKGE	*Woodward 345kV
	GEN-2008-003	101	OKGE	*Woodward EHV 138kV
	GEN-2008-013	300	OKGE	Wichita - Woodring 345kV
	GEN-2008-019	300	OKGE	*Tatonga 345kV
WOODWARD SUBTOTAL		2,338		
AREA SUBTOTAL		3,077		
Cluster	Request	Amount	Area	Proposed Point of Interconnection
Prior Queued	GEN-2002-006	150	SPS	Texas County 115kV
	GEN-2002-008	240	SPS	*Hitchland 345kV
	GEN-2002-009	80	SPS	Hansford County 115kV
	GEN-2003-013	198	SPS	*Hitchland - Finney 345kV
	GEN-2003-020	160	SPS	Carson County 115kV
	GEN-2005-017	340	SPS	*Hitchland - Potter County 345kV
	GEN-2006-020	20	SPS	*Hitchland - Sherman County Tap
	GEN-2006-044	370	SPS	*Hitchland 345kV
	GEN-2006-049	400	SPS	*Hitchland - Finney 345kV
PRIOR QUEUED SUBTOTAL		1,958		
Cluster	Request	Amount	Area	Proposed Point of Interconnection
Hitchland	GEN-2007-005	200	SPS	Pringle 115kV
	GEN-2007-046	200	SPS	*Hitchland 115kV
	GEN-2007-057	35	SPS	Moore County East 115kV
HITCHLAND SUBTOTAL		435		
AREA SUBTOTAL		2,393		

Appendix C: Study Groupings



Cluster	Request	Amount	Area	Proposed Point of Interconnection
Prior Queued	GEN-2001-039A	105	MKEC	Greensburg - Judson-Large 115kV
	GEN-2002-025A	150	MKEC	Spearville 230kV
	GEN-2004-014	155	MKEC	Spearville 230kV
	GEN-2005-012	250	SUNC	Spearville 345kV
PRIOR QUEUED SUBTOTAL		660		
Cluster	Request	Amount	Area	Proposed Point of Interconnection
Spearville	GEN-2006-006	205	MKEC	Spearville 230kV
	GEN-2007-025	300	WERE	Wichita-Woodring 345kV
	GEN-2007-038	200	SUNC	Spearville 345kV
	GEN-2008-018	405	SUNC	Finney 345kV
	SPEARVILLE SUBTOTAL		1110	
AREA SUBTOTAL		1,770		

Cluster	Request	Amount	Area	Proposed Point of Interconnection
Prior Queued	GEN-2001-039M	100	SUNC	Leoti - City Services 115kV
	GEN-2006-032	200	MIDW	South Hays 230kV
	GEN-2006-034	81	SUNC	Kanarado - Sharon Springs 115kV
	GEN-2006-040	100	SUNC	Mingo 115kV
	GEN-2007-011	135	SUNC	Syracuse 115kV
	GEN-2007-013	99	SUNC	Selkirk 115kV
PRIOR QUEUED SUBTOTAL		715		
Cluster	Request	Amount	Area	Proposed Point of Interconnection
	GEN-2008-017	300	SUNC	Setab 345kV
MINGO/NW KANSAS SUBTOTAL		300		
AREA SUBTOTAL		1,015		

Cluster	Request	Amount	Area	Proposed Point of Interconnection
Prior Queued	GEN-2002-022	240	SPS	Bushland 230kV
	GEN-2004-003	140	SPS	Conway 115kV
	GEN-2005-021	86	SPS	Kirby 115kV
	GEN-2006-039	400	SPS	Tap and Tie both Potter County - Plant X 230kV and Bushland - Deaf Smith 230kV
	GEN-2006-045	240	SPS	Dewey 138kV
	GEN-2006-047	240	SPS	Tap and Tie both Potter County - Plant X 230kV and Bushland - Deaf Smith 230kV
	GEN-2007-002	160	SPS	Grapevine 115kV
PRIOR QUEUED SUBTOTAL		1,506		
Cluster	Request	Amount	Area	Proposed Point of Interconnection
	GEN-2007-048	400	SPS	Amarillo South - Swisher County 230kV
AMARILLO SUBTOTAL		400		
AREA SUBTOTAL		1,906		

Appendix C: Study Groupings



Cluster	Request	Amount	Area	Proposed Point of Interconnection
Prior Queued	GEN-2001-033	180	SPS	San Juan Mesa Tap 230kV
	GEN-2001-036	80	SPS	Caprock Tap 115kV
	GEN-2005-010	160	SPS	Roosevelt County - Tolk West 230kV (Single Ckt Tap)
	GEN-2005-015	150	SPS	TUCO - Okaunion 345kV
PRIOR QUEUED SUBTOTAL		570		
Cluster	Request	Amount	Area	Proposed Point of Interconnection
	GEN-2007-034	150	SPS	Tolk - Eddy County 345kV
	GEN-2008-008	60	SPS	Graham 115kV
	GEN-2008-009	60	SPS	San Juan Mesa 230kV
	GEN-2008-014	150	SPS	TUCO - Okaunion 345kV
	GEN-2008-016	248	SPS	Grassland 230kV
SOUTH PANHANDLE/NM SUBTOTAL		668		
AREA SUBTOTAL		1,238		

Cluster	Request	Amount	Area	Proposed Point of Interconnection
Prior Queued	GEN-2001-026	74	WFEC	Fort Supply 138kV
	GEN-2003-004	101	WFEC	Washita 138kV
	GEN-2003-005	100	WFEC	Anadarko - Paradise 138kV
	GEN-2003-022	120	AEPW	Washita 138kV
	GEN-2004-020	27	AEPW	Washita 138kV
	GEN-2004-023	21	WFEC	Washita 138kV
	GEN-2005-003	31	WFEC	Washita 138kV
	GEN-2006-002	150	AEPW	Grapevine - Elk City 230kV
	GEN-2006-035	225	AEPW	Grapevine - Elk City 230kV
	GEN-2006-043	99	AEPW	Grapevine - Elk City 230kV
PRIOR QUEUED SUBTOTAL		948		
Cluster	Request	Amount	Area	Proposed Point of Interconnection
SW Oklahoma ^	GEN-2007-032	150	WFEC	Clinton Junction - Clinton 138kV
	GEN-2007-043	300	AEPW	Lawton Eastside - Cimarron 345kV
	GEN-2007-052	150	WFEC	Anadarko 138kV
SW OKLAHOMA SUBTOTAL		600		
AREA SUBTOTAL		1,548		
***CLUSTERED TOTAL (w/o PRIOR QUEUED)		5,851		
***CLUSTERED TOTAL (w/PRIOR QUEUED)		12,936		

* Planned Facility

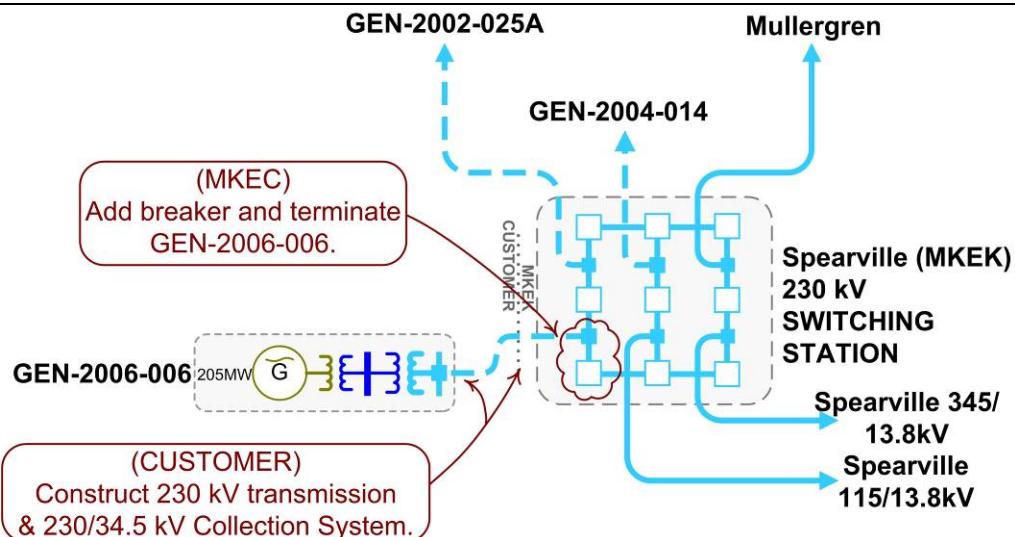
^ Proposed Facility

** Alternate requests - counted as one request for study purpose

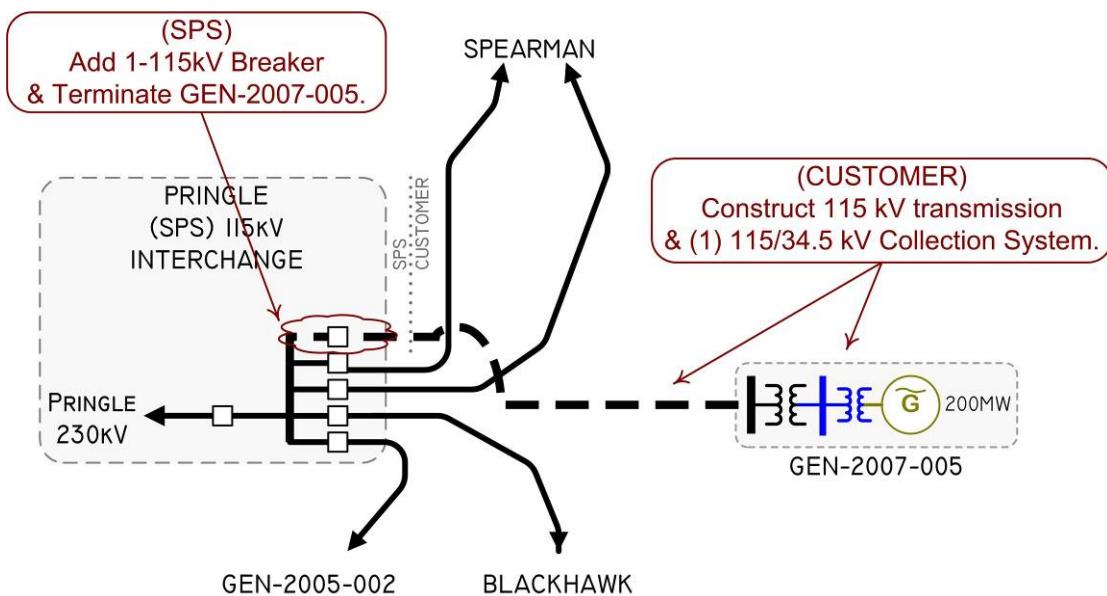
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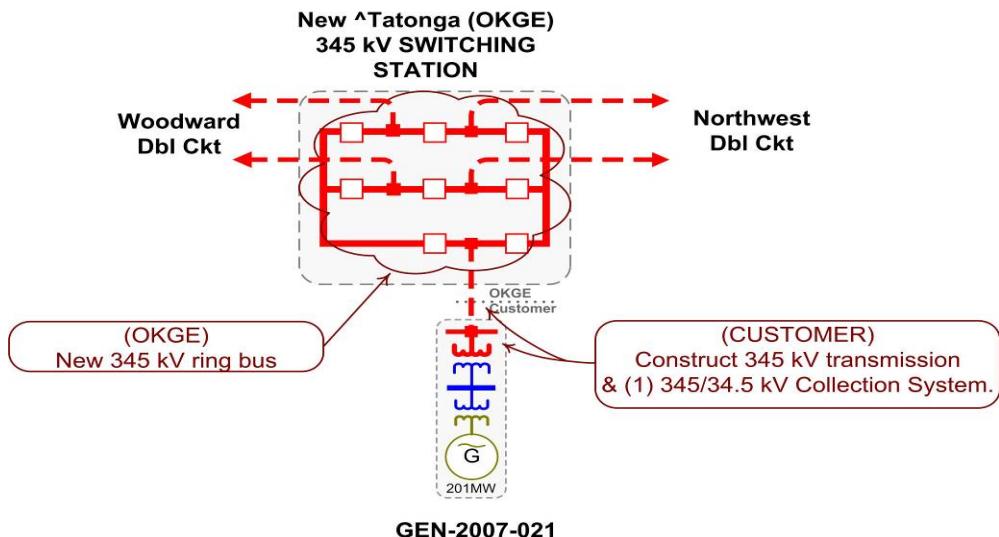
D: Proposed Point of Interconnection One line Diagrams

GEN-2006-006



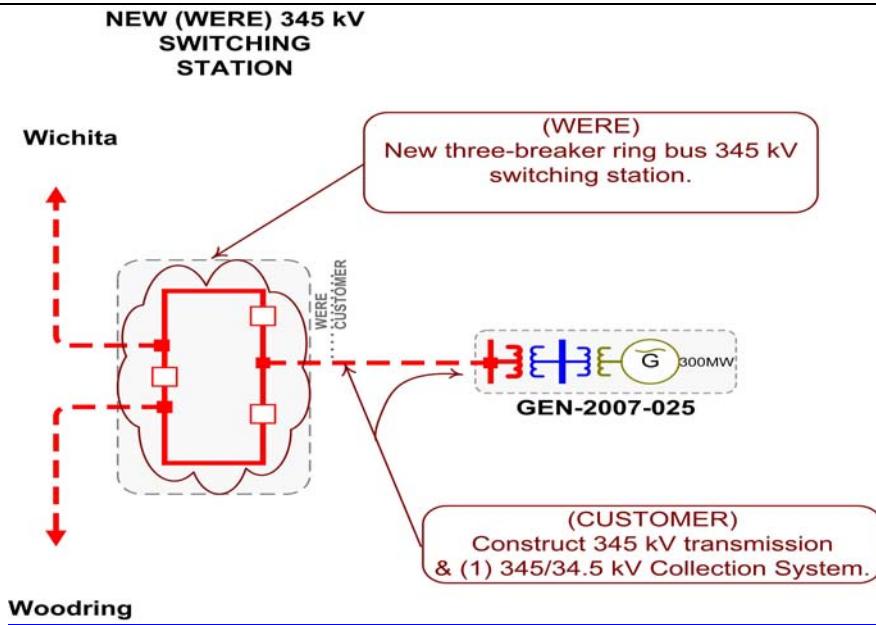
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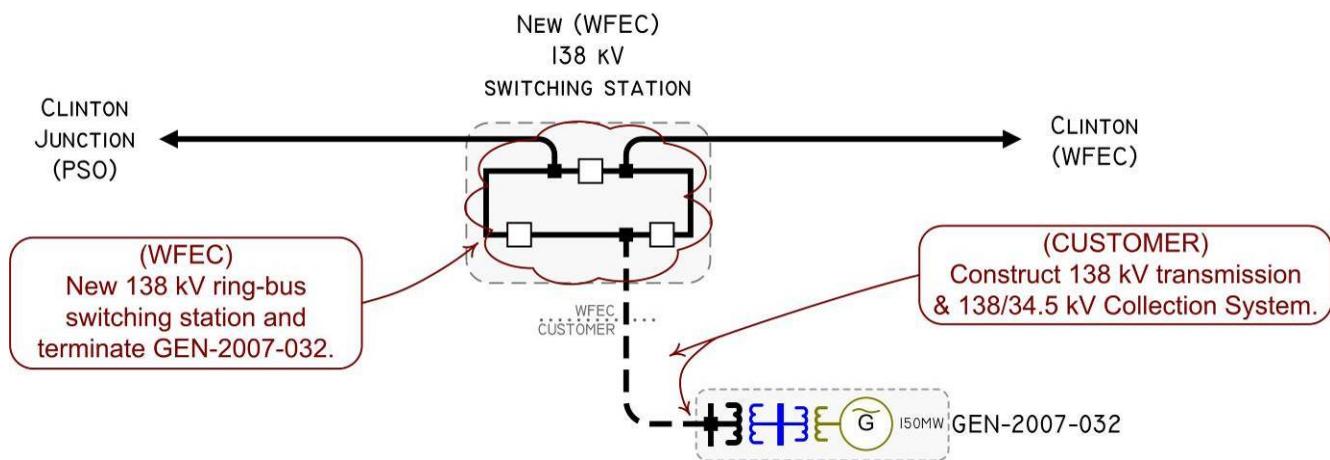


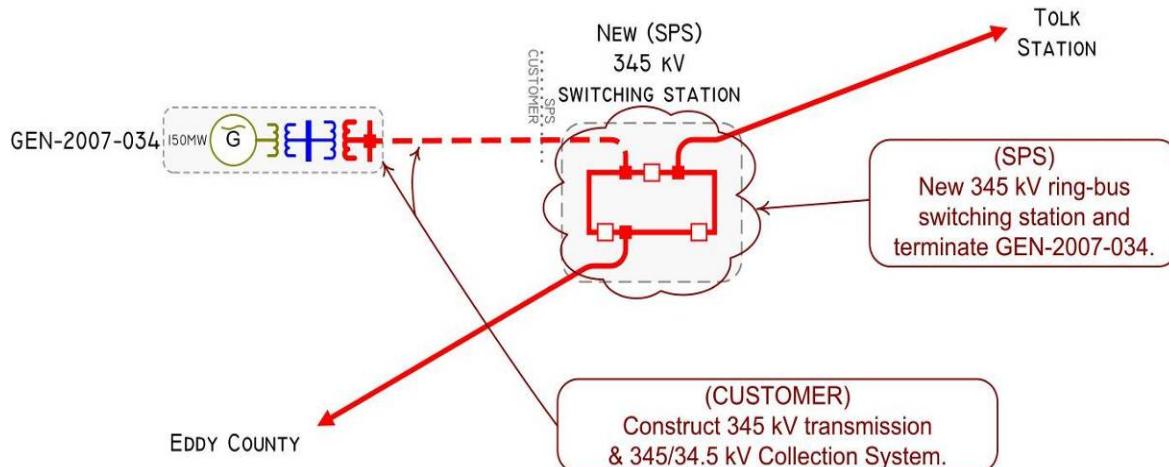
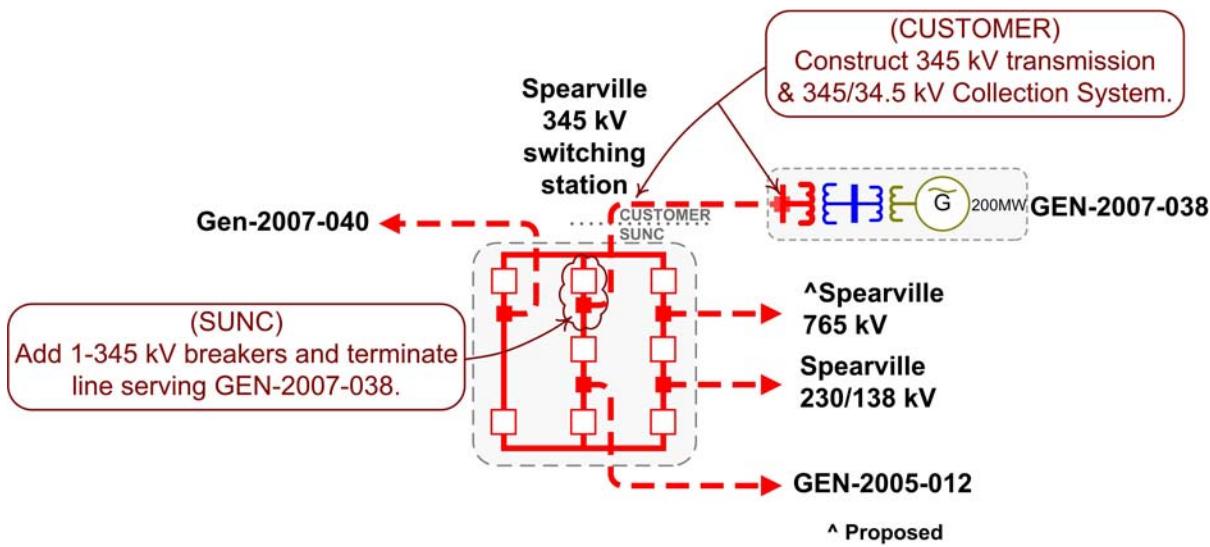
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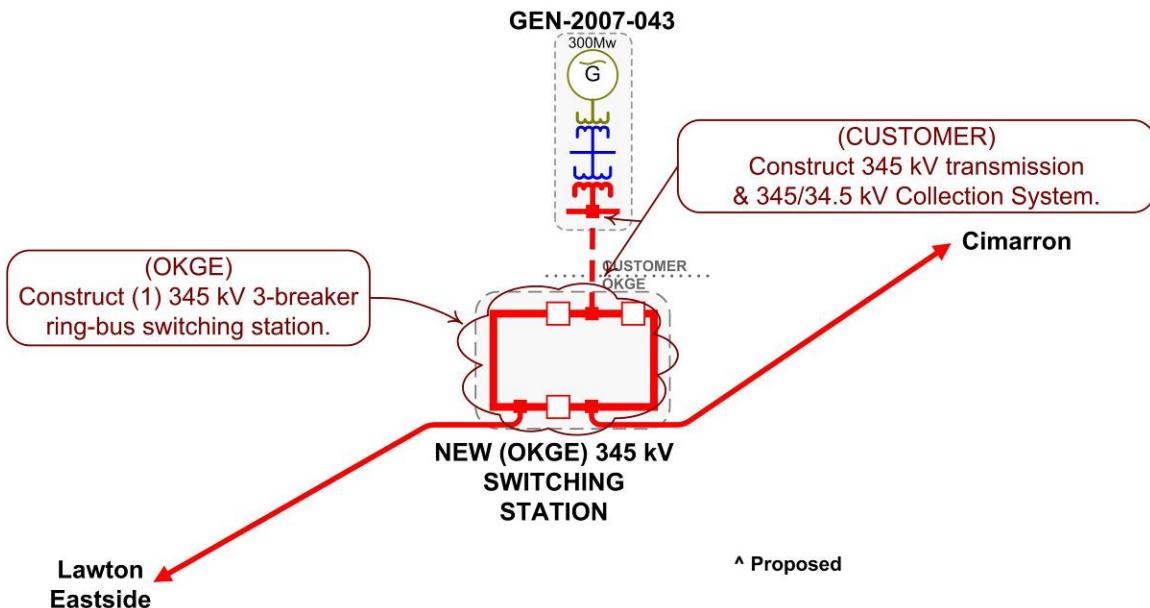
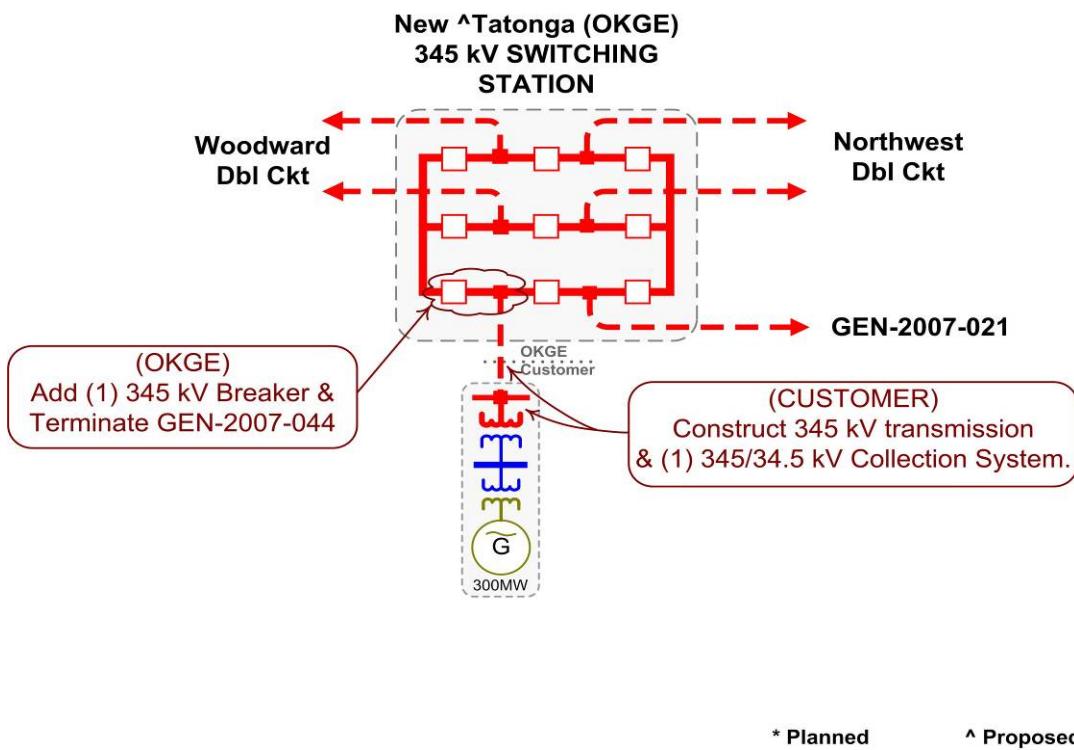
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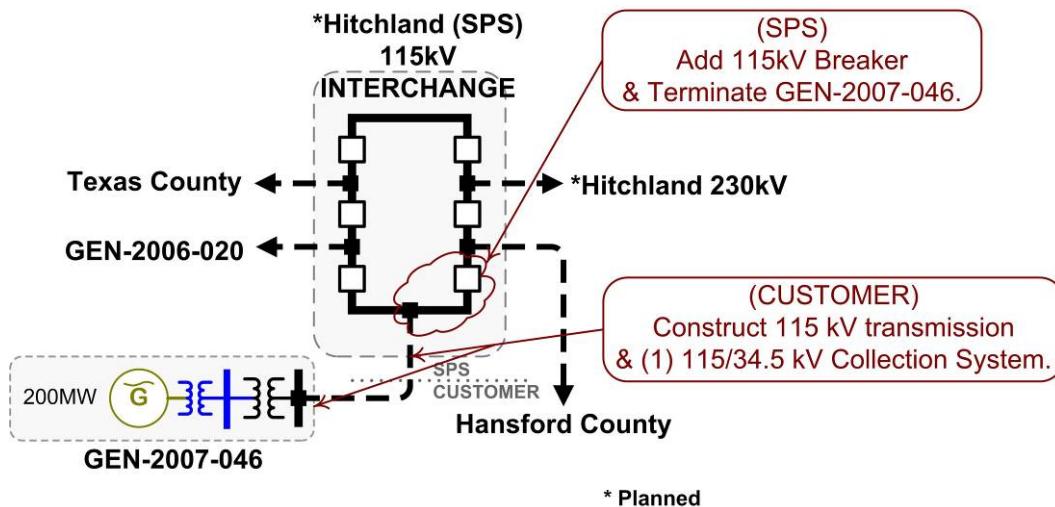
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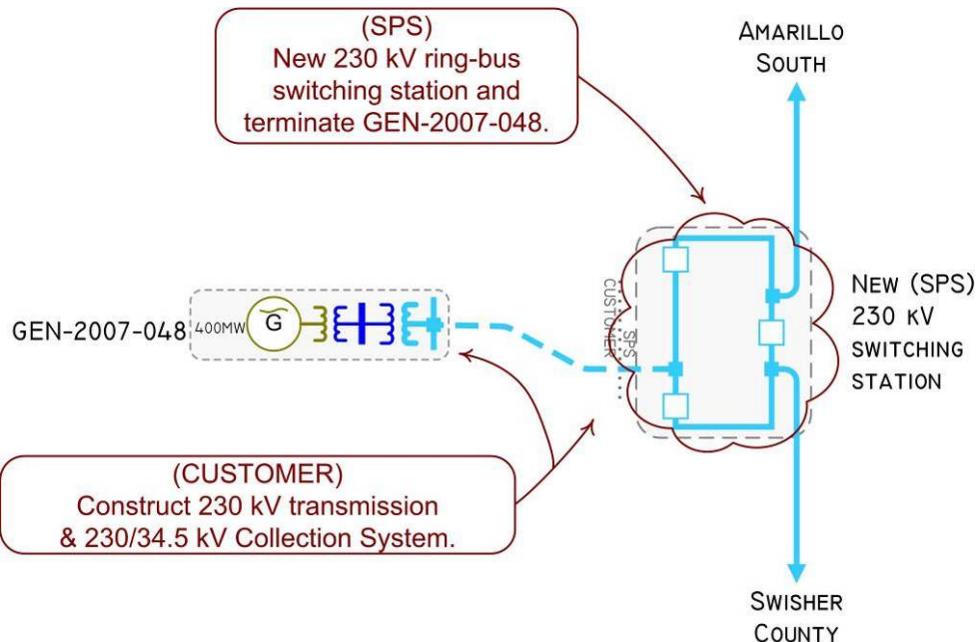
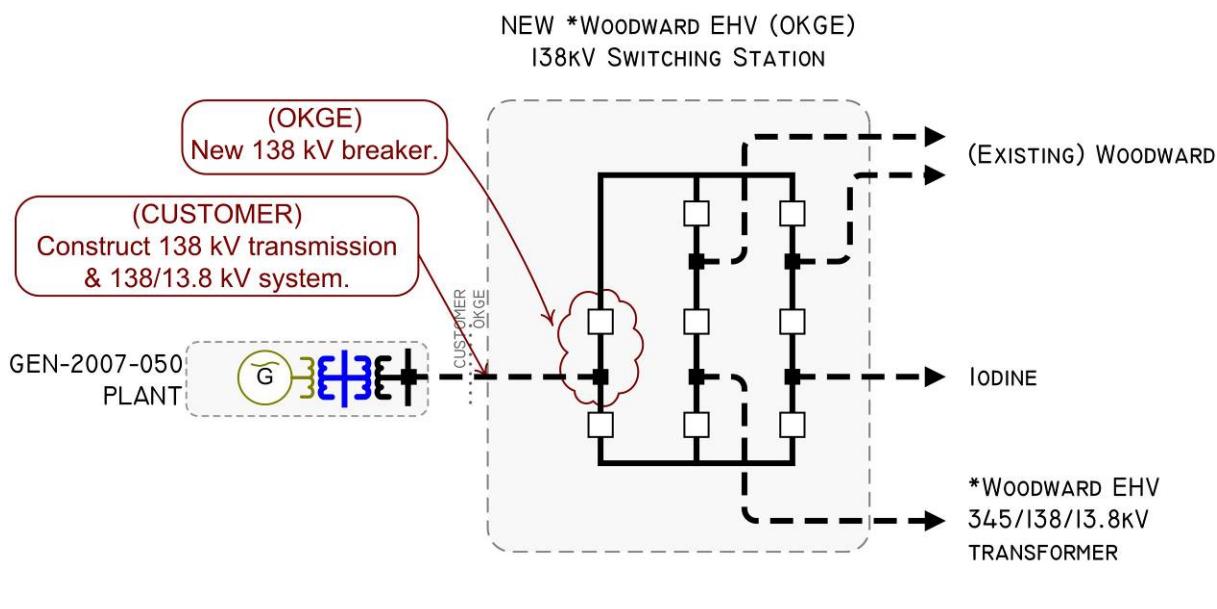
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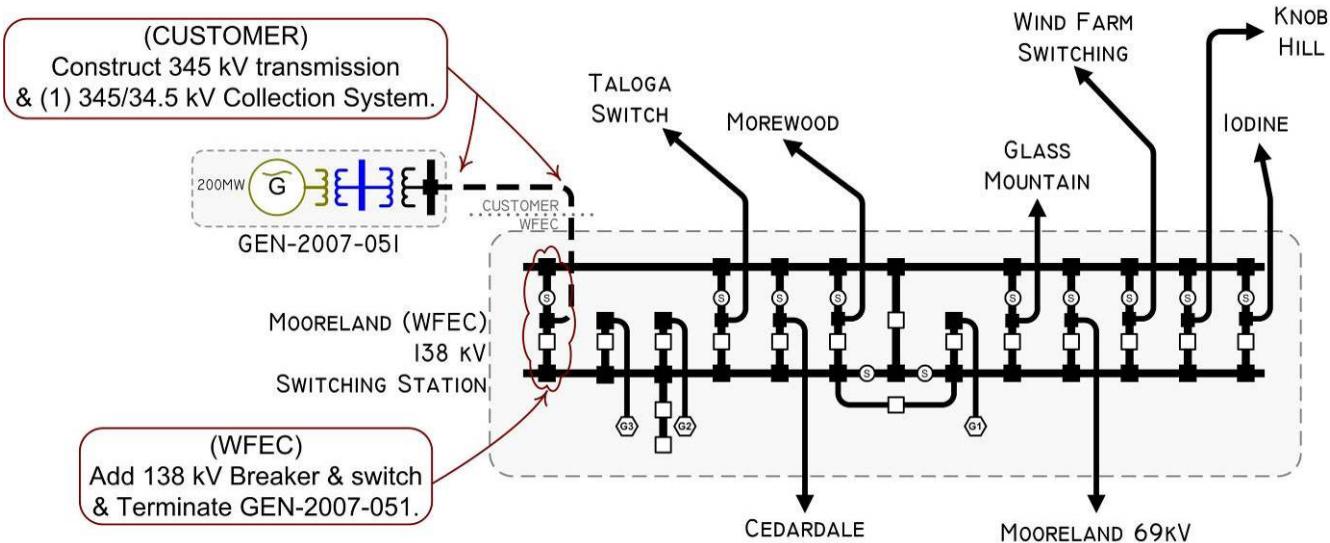
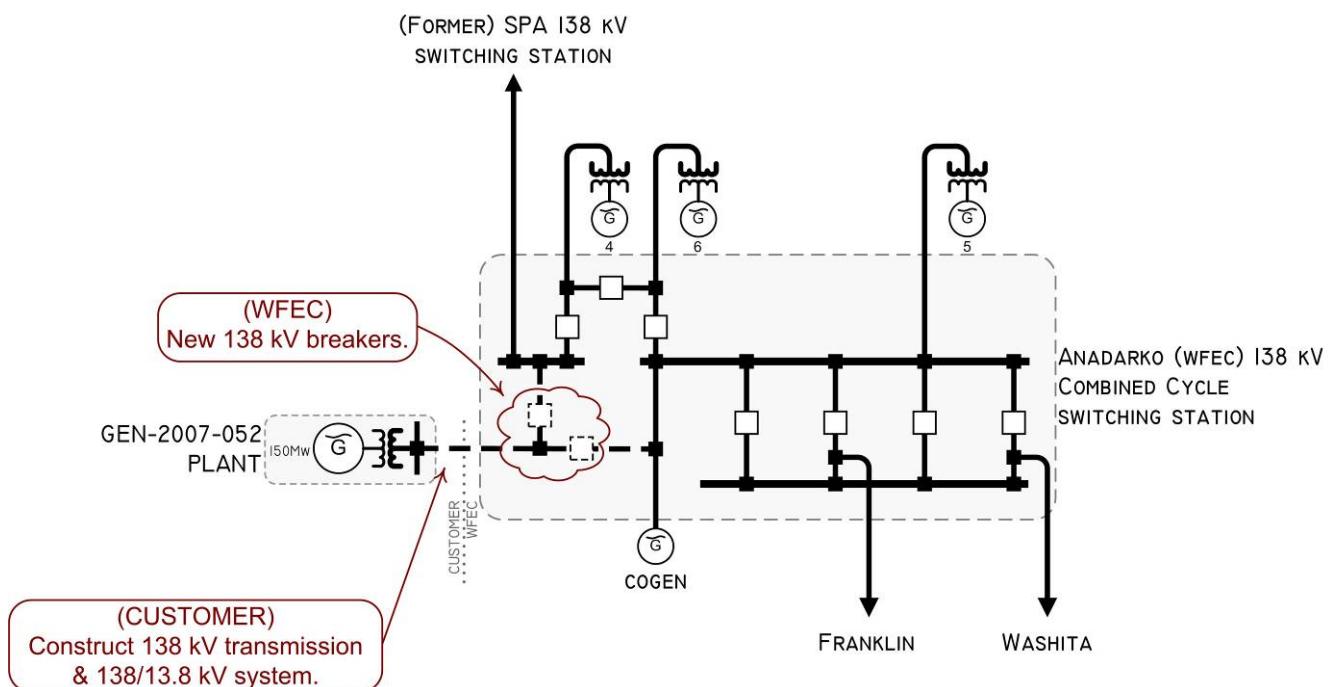
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GEN-2007-034**GEN-2007-038**

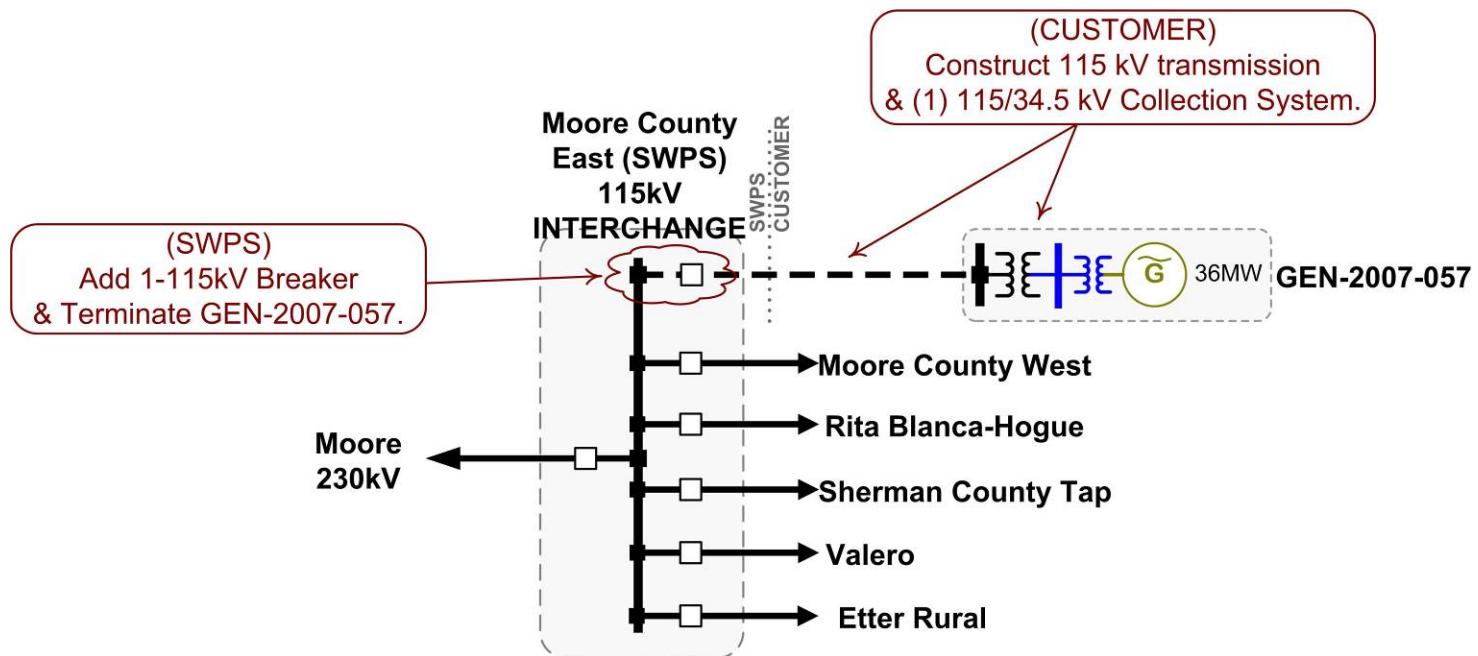
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GEN-2007-046

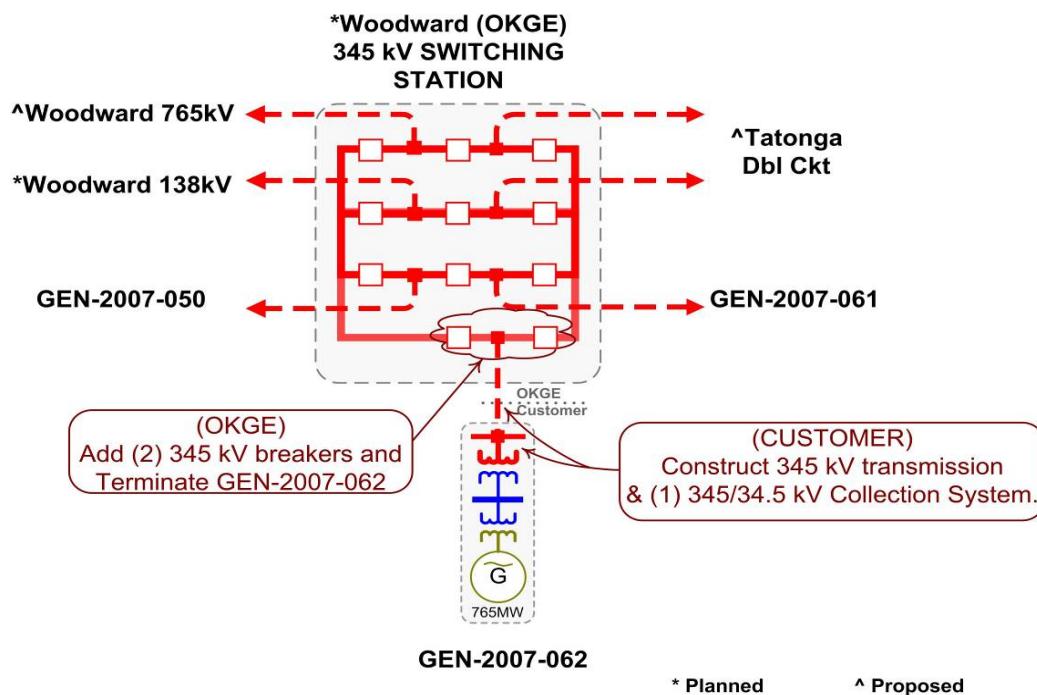
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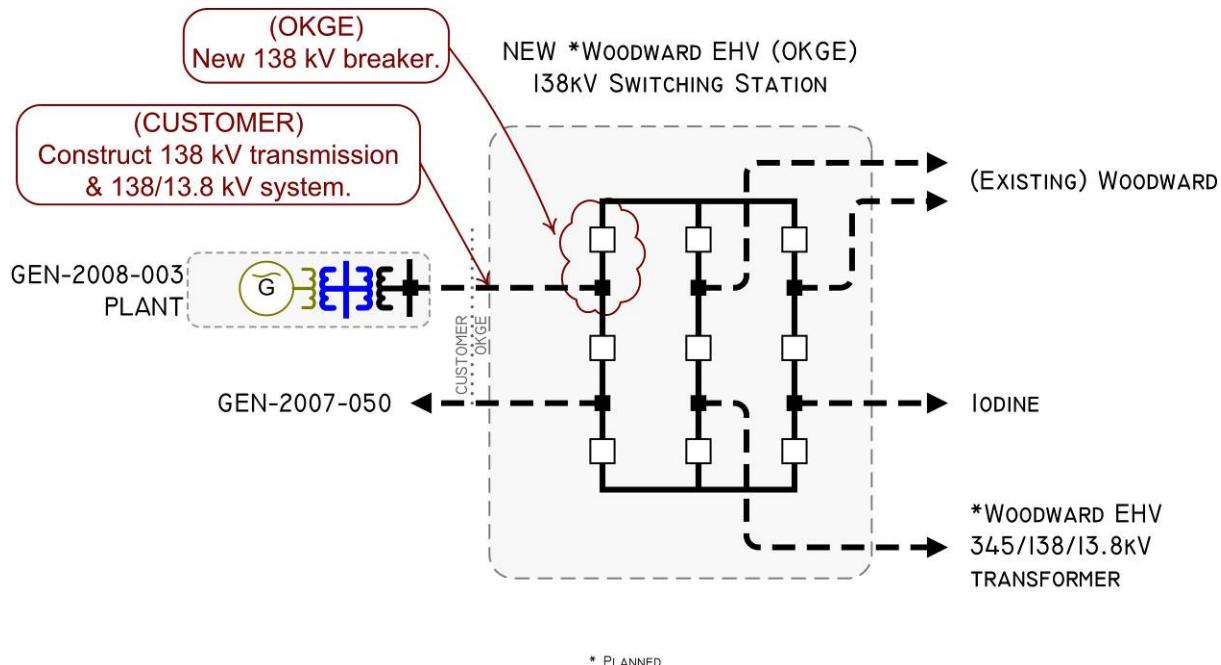
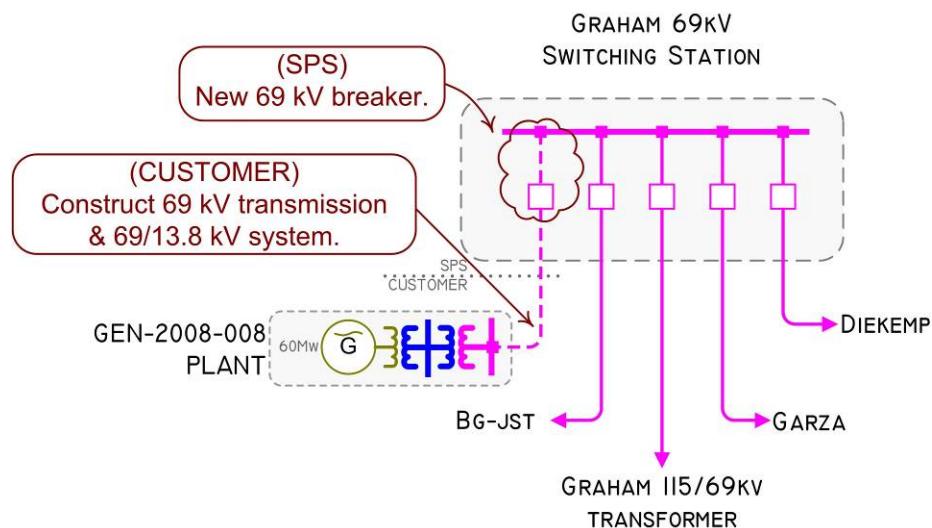
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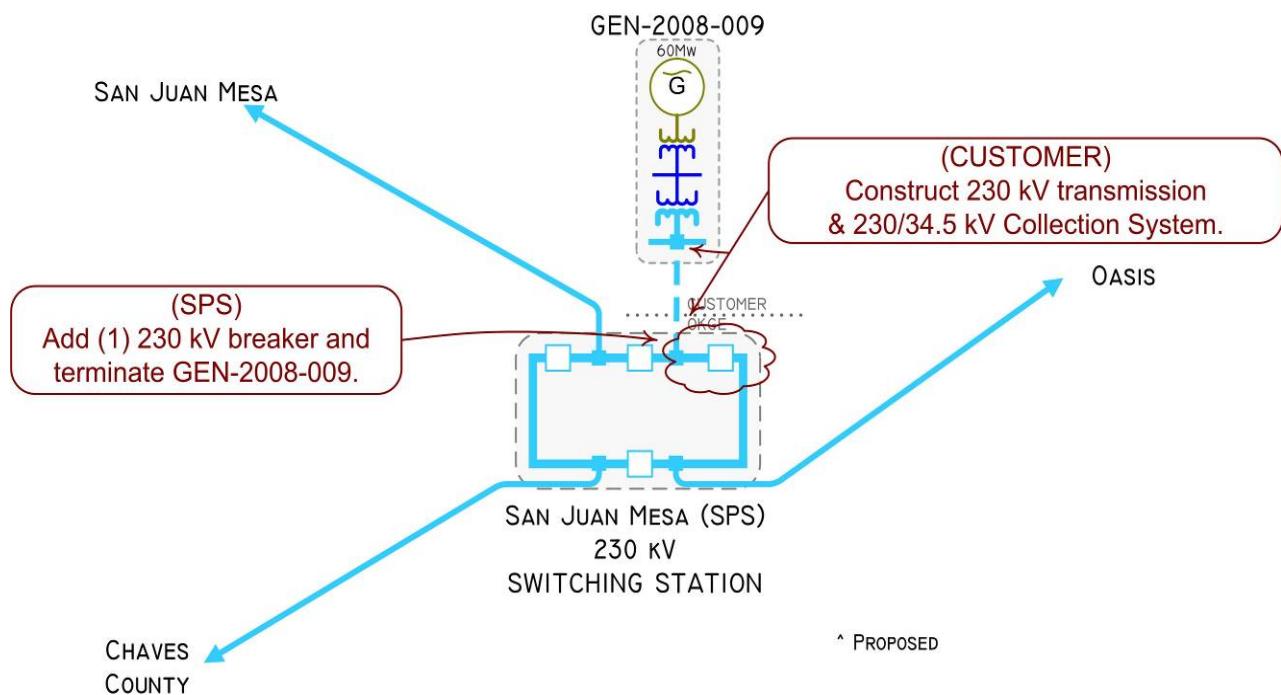
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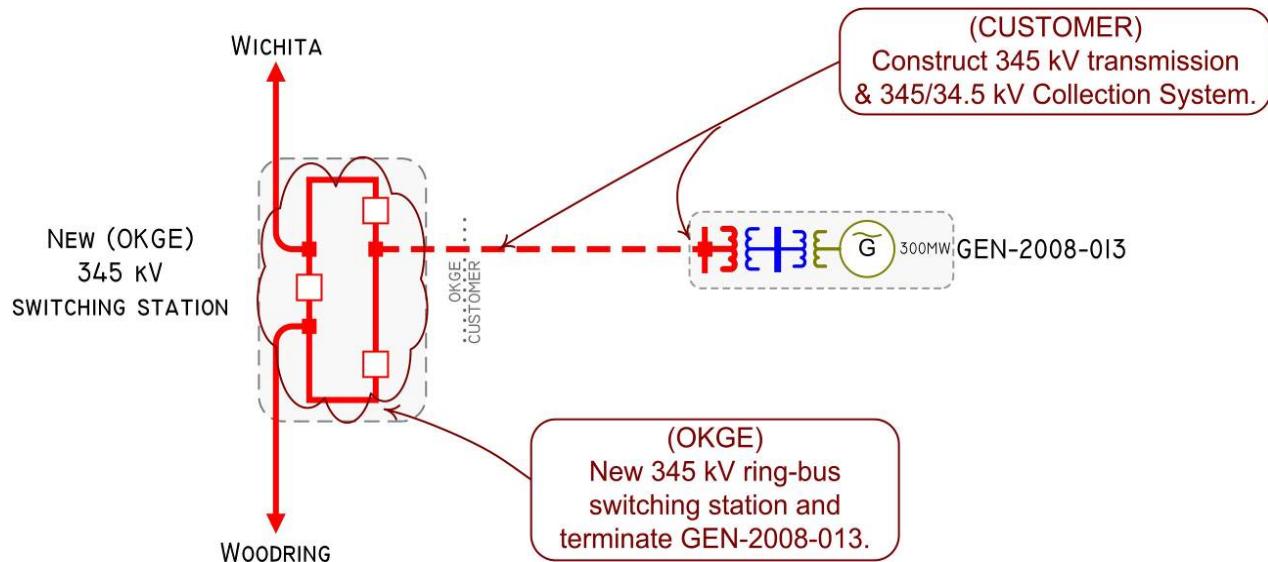
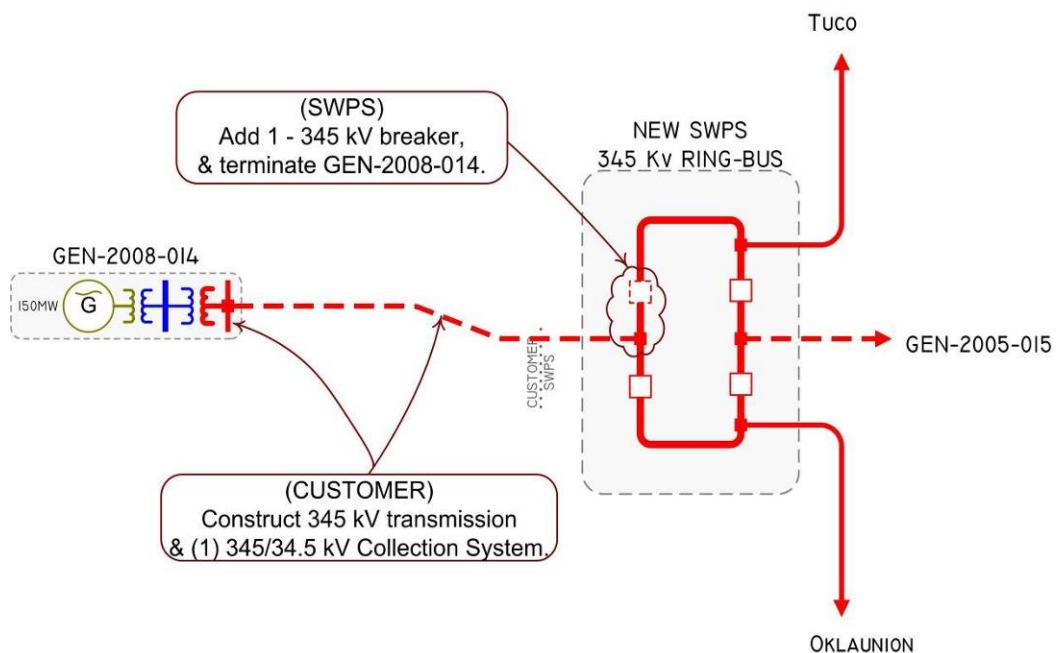


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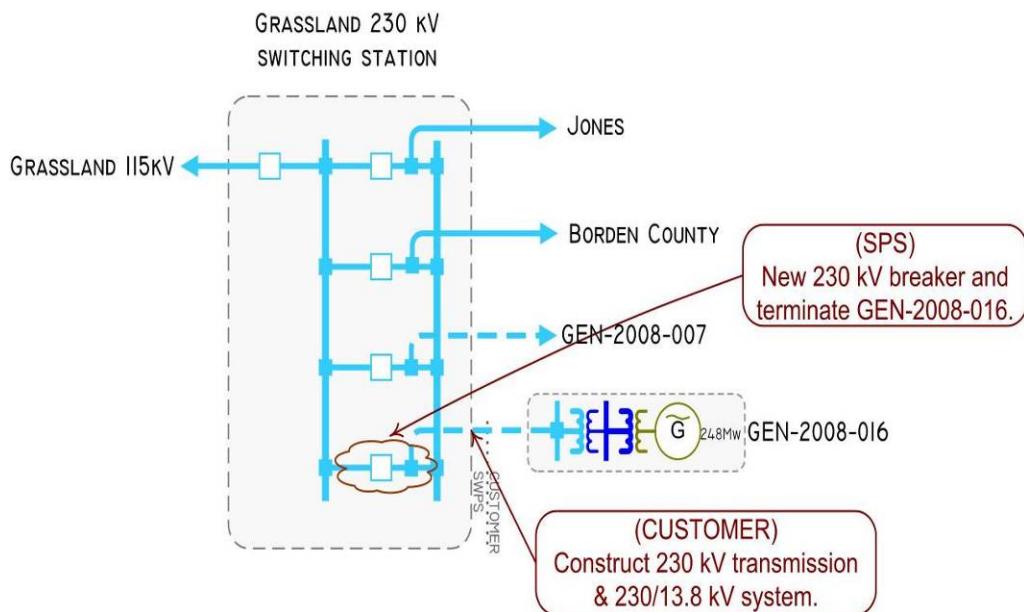


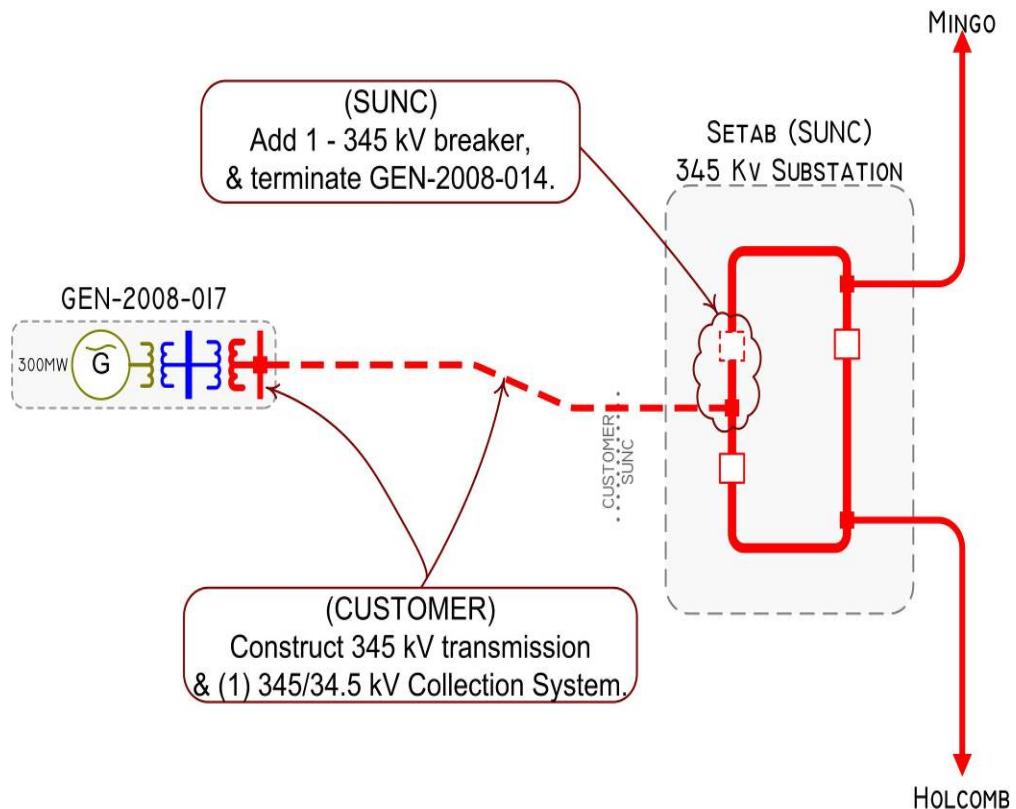
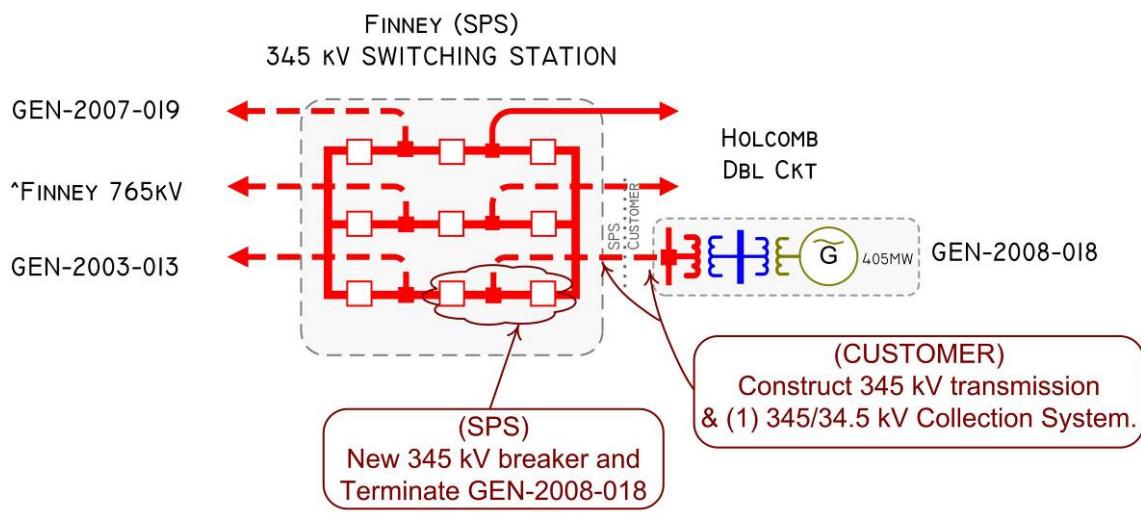
GEN-2008-003**GEN-2008-008**

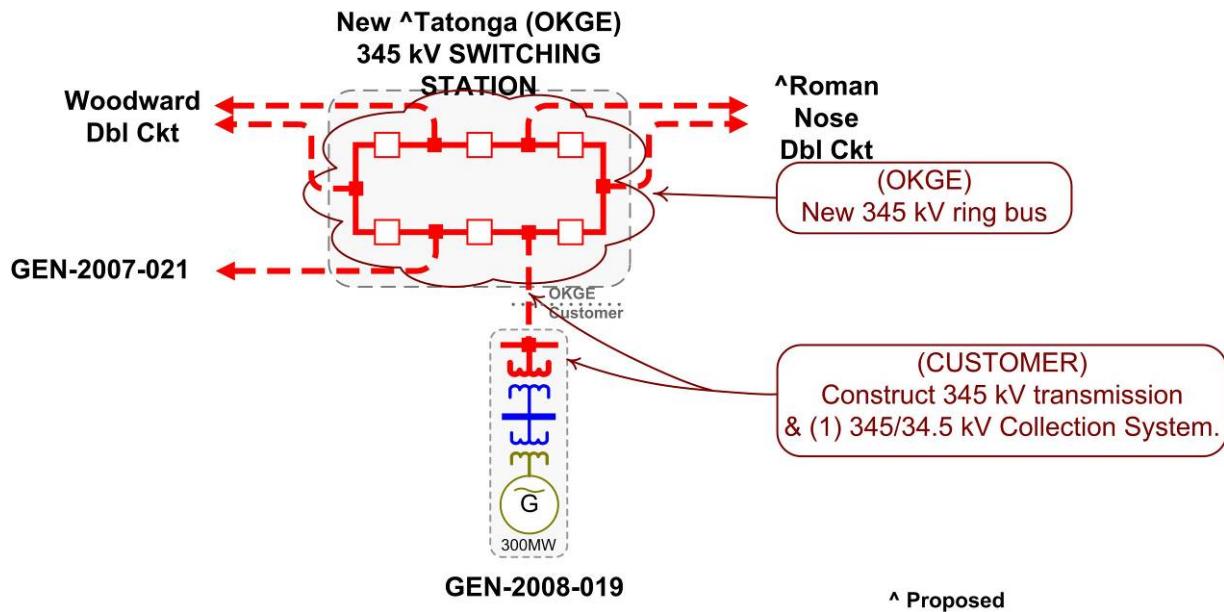
GEN-2008-009

GEN-2008-013**GEN-2008-014**

GEN-2008-016



GEN-2008-017**GEN-2008-018**

GEN-2008-019

E: Cost Allocation per Interconnection Request

Appendix E. - Cost Allocation Per Request

(Including Previously Allocated Network Upgrades*)

Interconnection Request	Upgrade Type	Allocated Costs	E + C Costs
GEN-2006-006			
GEN-2006-006 Interconnection Cost See Oneline Diagram		\$5,447,000.00	\$5,447,000.00
Spearville (SPEARVL2) 345/230/13.8KV Transformer CKT 2		\$6,400,000.00	\$6,400,000.00
Spearville - Comanche 345KV CKT 1		\$12,722,320.64	\$58,500,000.00
Comanche - Woodward 345KV CKT 1		\$4,748,360.77	\$104,224,853.00
Medicine Lodge - Wichita 345KV CKT 1		\$4,580,650.44	\$90,000,000.00
Comanche - Medicine Lodge 345KV CKT 1		\$3,201,365.70	\$62,900,000.00
Woodward - Sooner Wind 138kV		\$153,357.84	\$4,500,000.00
Spearville - Knoll - Axtell 345kV	Balanced Portfolio		\$236,000,000.00
Total E & C Cost for Spearville-Knoll-Axtell Project		Current Study Total	\$37,253,055.39
GEN-2007-005			
GEN-2007-005 Interconnection Cost See Oneline Diagram		\$3,925,014.00	\$3,925,014.00
Medicine Lodge - Wichita 345KV CKT 1		\$3,647,083.30	\$90,000,000.00
Comanche - Medicine Lodge 345KV CKT 1		\$2,548,906.00	\$62,900,000.00
Stevens County - Gray County 345KV CKT 1		\$18,704,223.16	\$70,907,000.00
Comanche - Woodward 345KV CKT 1		\$2,274,343.38	\$104,224,853.00
Spearville - Comanche 345KV CKT 1		\$1,333,153.14	\$58,500,000.00
Woodward - Sooner Wind 138kV		\$118,415.82	\$4,500,000.00
Hitchland - Woodward 345kV CKT 1 Assigned to GEN-2006-049; If withdraws will trigger restudy	Assigned to Higher Queued GI		\$93,000,000.00
Finney Switching Station - Holcomb 345KV CKT 2 Assigned to GEN-2006-044; If withdraws will trigger restudy	Assigned to Higher Queued GI		\$6,299,839.00
Tuco - Woodward 345kV	Balanced Portfolio		\$229,000,000.00
Total E & C Cost for TUOCO - Woodward Project		Current Study Total	\$32,551,138.80

* Current Study Requests' Costs of Previously Allocated Network Upgrades will be determined by a restudy, if necessary.

Interconnection Request	Upgrade Type	Allocated Costs	E + C Costs
GEN-2007-021			
GEN-2007-021 Interconnection Cost See Oneline Diagram		\$3,073,000.00	\$3,073,000.00
Comanche - Woodward 345KV CKT 1		\$5,722,249.96	\$104,224,853.00
Medicine Lodge - Wichita 345KV CKT 1		\$3,652,761.87	\$90,000,000.00
Comanche - Medicine Lodge 345KV CKT 1		\$2,552,874.68	\$62,900,000.00
Woodward - Sooner Wind 138kV		\$239,980.75	\$4,500,000.00
	Current Study Total	\$15,240,867.26	
GEN-2007-025			
GEN-2007-025 Interconnection Cost		\$10,732,000.00	\$10,732,000.00
	Current Study Total	\$10,732,000.00	
GEN-2007-032			
GEN-2007-032 Interconnection Cost See Oneline Diagram		\$2,200,000.00	\$2,200,000.00
Clinton Jct Switches		\$150,000.00	\$150,000.00
	Current Study Total	\$2,350,000.00	
GEN-2007-034			
GEN-2007-034 Interconnection Cost See Oneline Diagram		\$12,892,997.00	\$12,892,997.00
Tolk Station East - TUCO Interchange 230kV CKT 1 Replace Line Traps		\$145,287.34	\$200,000.00
Deaf Smith - Bushland 230kV Line Trap Replace Line Traps		\$140,690.82	\$200,000.00
Comanche - Woodward 345KV CKT 1		\$2,277,858.34	\$104,224,853.00
Medicine Lodge - Wichita 345KV CKT 1		\$2,438,698.50	\$90,000,000.00
Comanche - Medicine Lodge 345KV CKT 1		\$1,704,379.29	\$62,900,000.00
Woodward - Sooner Wind 138kV		\$79,917.93	\$4,500,000.00
Tuco - Woodward 345kV	Balanced Portfolio		\$229,000,000.00
Total E & C Cost for TUCO - Woodward Project			
Hitchland - Woodward 345kV CKT 1 Assigned to GEN-2006-049; If withdraws will trigger restudy	Assigned to Higher Queued GI		\$93,000,000.00
Finney Switching Station - Holcomb 345KV CKT 2 Assigned to GEN-2006-044; If withdraws will trigger restudy	Assigned to Higher Queued GI		\$6,299,839.00

* Current Study Requests' Costs of Previously Allocated Network Upgrades will be determined by a restudy, if necessary.

Interconnection Request	Upgrade Type	Allocated Costs	E + C Costs
	Current Study Total	\$19,679,829.22	
GEN-2007-038			
GEN-2007-038 Interconnection Cost		\$3,663,731.00	\$3,663,731.00
See Oneline Diagram			
Spearville - Comanche 345KV CKT 1		\$12,846,512.68	\$58,500,000.00
Comanche - Woodward 345KV CKT 1		\$4,724,769.28	\$104,224,853.00
Comanche - Medicine Lodge 345KV CKT 1		\$3,288,646.53	\$62,900,000.00
Medicine Lodge - Wichita 345KV CKT 1		\$4,705,535.57	\$90,000,000.00
Woodward - Sooner Wind 138kV		\$153,524.03	\$4,500,000.00
Spearville - Knoll - Axtell 345kV	Balanced Portfolio		\$236,000,000.00
Total E & C Cost for Spearville-Knoll-Axtell Project		Current Study Total	\$29,382,719.09
GEN-2007-043			
GEN-2007-043 Interconnection Cost		\$8,732,000.00	\$8,732,000.00
See Oneline Diagram			
	Current Study Total	\$8,732,000.00	
GEN-2007-044			
GEN-2007-044 Interconnection Cost		\$3,073,000.00	\$3,073,000.00
See Oneline Diagram			
Comanche - Woodward 345KV CKT 1		\$8,540,671.58	\$104,224,853.00
Comanche - Medicine Lodge 345KV CKT 1		\$3,810,260.72	\$62,900,000.00
Medicine Lodge - Wichita 345KV CKT 1		\$5,451,883.39	\$90,000,000.00
Woodward - Sooner Wind 138kV		\$358,180.22	\$4,500,000.00
	Current Study Total	\$21,233,995.91	
GEN-2007-046			
GEN-2007-046 Interconnection Cost		\$545,411.00	\$545,411.00
See Oneline Diagram			
Medicine Lodge - Wichita 345KV CKT 1		\$3,752,152.09	\$90,000,000.00
Comanche - Medicine Lodge 345KV CKT 1		\$2,622,337.41	\$62,900,000.00
Stevens County - Gray County 345KV CKT 1		\$20,048,605.79	\$70,907,000.00

* Current Study Requests' Costs of Previously Allocated Network Upgrades will be determined by a restudy, if necessary.

Interconnection Request	Upgrade Type	Allocated Costs	E + C Costs
Comanche - Woodward 345KV CKT 1		\$2,154,386.33	\$104,224,853.00
Spearville - Comanche 345KV CKT 1		\$1,641,011.99	\$58,500,000.00
Woodward - Sooner Wind 138kV		\$137,277.77	\$4,500,000.00
Hitchland - Woodward 345kV CKT 1 Assigned to GEN-2006-049; If withdraws will trigger restudy	Assigned to Higher Queued GI		\$93,000,000.00
Finney Switching Station - Holcomb 345KV CKT 2 Assigned to GEN-2006-044; If withdraws will trigger restudy	Assigned to Higher Queued GI		\$6,299,839.00
		Current Study Total	\$30,901,182.38
GEN-2007-048			
GEN-2007-048 Interconnection Cost See Oneline Diagram		\$3,558,890.00	\$3,558,890.00
Swisher - Amarillo South Line Traps		\$77,464.00	\$77,464.00
Medicine Lodge - Wichita 345KV CKT 1		\$6,721,465.14	\$90,000,000.00
Comanche - Medicine Lodge 345KV CKT 1		\$4,697,557.30	\$62,900,000.00
Comanche - Woodward 345KV CKT 1		\$5,369,066.15	\$104,224,853.00
Stevens County - Gray County 345KV CKT 1		\$29,039,553.82	\$70,907,000.00
Spearville - Comanche 345KV CKT 1		\$746,332.33	\$58,500,000.00
Hitchland - Woodward 345kV CKT 1 Assigned to GEN-2006-049; If withdraws will trigger restudy	Assigned to Higher Queued GI		\$93,000,000.00
Tuco - Woodward 345kV Total E & C Cost for TUOCO - Woodward Project	Balanced Portfolio		\$229,000,000.00
Finney Switching Station - Holcomb 345KV CKT 2 Assigned to GEN-2006-044; If withdraws will trigger restudy	Assigned to Higher Queued GI		\$6,299,839.00
		Current Study Total	\$50,210,328.74
GEN-2007-050			
GEN-2007-050 Interconnection Cost See Oneline Diagram		\$1,214,000.00	\$1,214,000.00
Comanche - Woodward 345KV CKT 1		\$5,764,807.70	\$104,224,853.00
Medicine Lodge - Wichita 345KV CKT 1		\$3,818,953.66	\$90,000,000.00
Comanche - Medicine Lodge 345KV CKT 1		\$2,669,024.28	\$62,900,000.00

* Current Study Requests' Costs of Previously Allocated Network Upgrades will be determined by a restudy, if necessary.

Interconnection Request	Upgrade Type	Allocated Costs	E + C Costs
Woodward - Sooner Wind 138kV		\$495,979.51	\$4,500,000.00
Current Study Total			\$13,962,765.15
GEN-2007-051			
GEN-2007-051 Interconnection Cost		\$2,500,000.00	\$2,500,000.00
Comanche - Woodward 345KV CKT 1		\$5,085,861.19	\$104,224,853.00
Medicine Lodge - Wichita 345KV CKT 1		\$3,222,529.45	\$90,000,000.00
Comanche - Medicine Lodge 345KV CKT 1		\$2,252,190.03	\$62,900,000.00
Current Study Total			\$13,060,580.67
GEN-2007-052			
GEN-2007-052 Interconnection Costs		\$909,000.00	\$909,000.00
Current Study Total			\$909,000.00
GEN-2007-057			
GEN-2007-057 Interconnection Cost		\$450,797.00	\$450,797.00
See Oneline Diagram			
Medicine Lodge - Wichita 345KV CKT 1		\$615,105.86	\$90,000,000.00
Comanche - Medicine Lodge 345KV CKT 1		\$429,890.65	\$62,900,000.00
Stevens County - Gray County 345KV CKT 1		\$3,114,617.23	\$70,907,000.00
Comanche - Woodward 345KV CKT 1		\$392,556.89	\$104,224,853.00
Spearville - Comanche 345KV CKT 1		\$211,865.01	\$58,500,000.00
Woodward - Sooner Wind 138kV		\$19,588.76	\$4,500,000.00
Hitchland - Woodward 345kV CKT 1	Assigned to Higher Queued GI		\$93,000,000.00
Assigned to GEN-2006-049; If withdraws will trigger restudy			
Finney Switching Station - Holcomb 345KV CKT 2	Assigned to Higher Queued GI		\$6,299,839.00
Assigned to GEN-2006-044; If withdraws will trigger restudy			
Tuco - Woodward 345kV	Balanced Portfolio		\$229,000,000.00
Total E & C Cost for TUOCO - Woodward Project			
Current Study Total			\$5,234,421.40
GEN-2007-062			
Comanche - Woodward 345KV CKT 1		\$28,325,216.13	\$104,224,853.00

* Current Study Requests' Costs of Previously Allocated Network Upgrades will be determined by a restudy, if necessary.

Interconnection Request	Upgrade Type	Allocated Costs	E + C Costs
GEN-2007-062 Interconnection Cost See Oneline Diagram		\$3,807,000.00	\$3,807,000.00
Comanche - Medicine Lodge 345KV CKT 1		\$13,275,713.94	\$62,900,000.00
Medicine Lodge - Wichita 345KV CKT 1		\$18,995,457.15	\$90,000,000.00
Woodward - Sooner Wind 138kV		\$1,341,913.47	\$4,500,000.00
	Current Study Total	\$65,745,300.69	
GEN-2008-003			
GEN-2008-003 Interconnection Cost		\$1,070,000.00	\$1,070,000.00
Comanche - Woodward 345KV CKT 1		\$3,404,944.90	\$104,224,853.00
Comanche - Medicine Lodge 345KV CKT 1		\$1,576,441.24	\$62,900,000.00
Medicine Lodge - Wichita 345KV CKT 1		\$2,255,639.30	\$90,000,000.00
Woodward - Sooner Wind 138kV		\$292,946.96	\$4,500,000.00
	Current Study Total	\$8,599,972.40	
GEN-2008-008			
GEN-2008-008 Interconnection Cost		\$622,212.00	\$622,212.00
See Oneline Diagram			
Comanche - Woodward 345KV CKT 1		\$975,082.04	\$104,224,853.00
Medicine Lodge - Wichita 345KV CKT 1		\$948,705.74	\$90,000,000.00
Comanche - Medicine Lodge 345KV CKT 1		\$663,039.90	\$62,900,000.00
Woodward - Sooner Wind 138kV		\$33,178.53	\$4,500,000.00
Tuco - Woodward 345kV	Balanced Portfolio		\$229,000,000.00
Total E & C Cost for TUOCO - Woodward Project			
Hitchland - Woodward 345kV CKT 1	Assigned to Higher Queued GI		\$93,000,000.00
Assigned to GEN-2006-049; If withdraws will trigger restudy			
	Current Study Total	\$3,242,218.21	
GEN-2008-009			
GEN-2008-009 Interconnection Cost		\$872,471.00	\$872,471.00
See Oneline Diagram			
Tolk Station East - TUOCO Interchange 230kV CKT 1		\$54,712.66	\$200,000.00
Replace Line Traps			

* Current Study Requests' Costs of Previously Allocated Network Upgrades will be determined by a restudy, if necessary.

Interconnection Request	Upgrade Type	Allocated Costs	E + C Costs
Deaf Smith - Bushland 230kV Line Trap		\$59,309.18	\$200,000.00
Replace Line Traps			
Comanche - Woodward 345KV CKT 1		\$909,134.79	\$104,224,853.00
Medicine Lodge - Wichita 345KV CKT 1		\$976,320.86	\$90,000,000.00
Comanche - Medicine Lodge 345KV CKT 1		\$682,339.80	\$62,900,000.00
Woodward - Sooner Wind 138kV		\$31,916.17	\$4,500,000.00
Tuco - Woodward 345kV	Balanced Portfolio		\$229,000,000.00
Total E & C Cost for TUOCO - Woodward Project			
Hitchland - Woodward 345kV CKT 1	Assigned to Higher Queued GI		\$93,000,000.00
Assigned to GEN-2006-049; If withdraws will trigger restudy			
Finney Switching Station - Holcomb 345KV CKT 2	Assigned to Higher Queued GI		\$6,299,839.00
Assigned to GEN-2006-044; If withdraws will trigger restudy			
	Current Study Total	\$3,586,204.46	
GEN-2008-013			
GEN-2008-013 Interconnection Cost		\$9,277,000.00	\$9,277,000.00
See Oneline Diagram			
	Current Study Total	\$9,277,000.00	
GEN-2008-014			
GEN-2008-014 Interconnection Cost		\$1,872,918.00	\$1,872,918.00
See Oneline Diagram			
Comanche - Woodward 345KV CKT 1		\$2,311,166.72	\$104,224,853.00
Comanche - Medicine Lodge 345KV CKT 1		\$1,361,284.74	\$62,900,000.00
Medicine Lodge - Wichita 345KV CKT 1		\$1,947,784.21	\$90,000,000.00
Woodward - Sooner Wind 138kV		\$60,472.40	\$4,500,000.00
Tuco - Woodward 345kV	Balanced Portfolio		\$229,000,000.00
Total E & C Cost for TUOCO - Woodward Project			
	Current Study Total	\$7,553,626.07	
GEN-2008-016			
GEN-2008-016 Interconnection Cost		\$892,129.00	\$892,129.00
Comanche - Woodward 345KV CKT 1		\$4,028,678.72	\$104,224,853.00
Medicine Lodge - Wichita 345KV CKT 1		\$3,921,949.41	\$90,000,000.00

* Current Study Requests' Costs of Previously Allocated Network Upgrades will be determined by a restudy, if necessary.

Interconnection Request	Upgrade Type	Allocated Costs	E + C Costs
Comanche - Medicine Lodge 345KV CKT 1		\$2,741,006.86	\$62,900,000.00
Grassland Interchange 230/115KV Transformer CKT 1 Replace		\$3,550,000.00	\$3,550,000.00
Woodward - Sooner Wind 138kV		\$137,137.93	\$4,500,000.00
Tuco - Woodward 345kV	Balanced Portfolio		\$229,000,000.00
Total E & C Cost for TUOCO - Woodward Project			
Hitchland - Woodward 345KV CKT 1	Assigned to Higher Queued GI		\$93,000,000.00
Assigned to GEN-2006-049; If withdraws will trigger restudy			
	Current Study Total	\$15,270,901.92	
GEN-2008-017			
GEN-2008-017 Interconnection Cost		\$1,900,000.00	\$1,900,000.00
See Oneline Diagram			
Spearville - Comanche 345KV CKT 1		\$11,839,839.40	\$58,500,000.00
Comanche - Medicine Lodge 345KV CKT 1		\$3,550,701.08	\$62,900,000.00
Medicine Lodge - Wichita 345KV CKT 1		\$5,080,494.39	\$90,000,000.00
Comanche - Woodward 345KV CKT 1		\$3,703,423.73	\$104,224,853.00
Woodward - Sooner Wind 138kV		\$196,941.74	\$4,500,000.00
Spearville - Knoll - Axtell 345kV	Balanced Portfolio		\$236,000,000.00
Total E & C Cost for Spearville-Knoll-Axtell Project			
	Current Study Total	\$26,271,400.34	
GEN-2008-018			
GEN-2008-018 Interconnection Cost		\$2,564,167.00	\$2,564,167.00
See Oneline Diagram			
Spearville - Comanche 345KV CKT 1		\$17,158,964.82	\$58,500,000.00
Medicine Lodge - Wichita 345KV CKT 1		\$7,814,946.28	\$90,000,000.00
Comanche - Medicine Lodge 345KV CKT 1		\$5,461,779.13	\$62,900,000.00
Comanche - Woodward 345KV CKT 1		\$4,971,602.83	\$104,224,853.00
Woodward - Sooner Wind 138kV		\$291,089.97	\$4,500,000.00
Spearville - Knoll - Axtell 345kV	Balanced Portfolio		\$236,000,000.00
Total E & C Cost for Spearville-Knoll-Axtell Project			
	Current Study Total	\$38,262,550.03	

* Current Study Requests' Costs of Previously Allocated Network Upgrades will be determined by a restudy, if necessary.

Interconnection Request	Upgrade Type	Allocated Costs	E + C Costs
GEN-2008-019			
GEN-2008-019 Interconnection Cost See Oneline Diagram		\$3,073,000.00	\$3,073,000.00
Comanche - Woodward 345KV CKT 1		\$8,540,671.58	\$104,224,853.00
Medicine Lodge - Wichita 345KV CKT 1		\$5,451,883.39	\$90,000,000.00
Comanche - Medicine Lodge 345KV CKT 1		\$3,810,260.72	\$62,900,000.00
Woodward - Sooner Wind 138kV		\$358,180.22	\$4,500,000.00
Current Study Total		\$21,233,995.91	

* Current Study Requests' Costs of Previously Allocated Network Upgrades will be determined by a restudy, if necessary.

F: Cost Allocation per Proposed Network Upgrade

Appendix F. - Cost Allocation Per Upgrade Facility

Upgrade Facility	Allocated Costs	E + C Costs
Clinton Jct Switches		\$150,000.00
Replace Switches		
GEN-2007-032	\$150,000.00	
	Total	\$150,000.00
Comanche - Medicine Lodge 345KV CKT 1		\$62,900,000.00
GEN-2006-006	\$3,201,365.70	
GEN-2007-005	\$2,548,906.00	
GEN-2007-021	\$2,552,874.68	
GEN-2007-034	\$1,704,379.29	
GEN-2007-038	\$3,288,646.53	
GEN-2007-044	\$3,810,260.72	
GEN-2007-046	\$2,622,337.41	
GEN-2007-048	\$4,697,557.30	
GEN-2007-050	\$2,669,024.28	
GEN-2007-051	\$2,252,190.03	
GEN-2007-057	\$429,890.65	
GEN-2007-062	\$13,275,713.94	
GEN-2008-003	\$1,576,441.24	
GEN-2008-008	\$663,039.90	
GEN-2008-009	\$682,339.80	
GEN-2008-014	\$1,361,284.74	
GEN-2008-016	\$2,741,006.86	
GEN-2008-017	\$3,550,701.08	
GEN-2008-018	\$5,461,779.13	
GEN-2008-019	\$3,810,260.72	
	Total	\$62,900,000.00
Comanche - Woodward 345KV CKT 1		\$104,224,853.01
GEN-2006-006	\$4,748,360.77	
GEN-2007-005	\$2,274,343.38	
GEN-2007-021	\$5,722,249.96	
GEN-2007-034	\$2,277,858.34	
GEN-2007-038	\$4,724,769.28	
GEN-2007-044	\$8,540,671.58	

Upgrade Facility	Allocated Costs	E + C Costs
GEN-2007-046	\$2,154,386.33	
GEN-2007-048	\$5,369,066.15	
GEN-2007-050	\$5,764,807.70	
GEN-2007-051	\$5,085,861.19	
GEN-2007-057	\$392,556.89	
GEN-2007-062	\$28,325,216.13	
GEN-2008-003	\$3,404,944.90	
GEN-2008-008	\$975,082.04	
GEN-2008-009	\$909,134.79	
GEN-2008-014	\$2,311,166.72	
GEN-2008-016	\$4,028,678.72	
GEN-2008-017	\$3,703,423.73	
GEN-2008-018	\$4,971,602.83	
GEN-2008-019	\$8,540,671.58	
Total	\$104,224,853.01	
Deaf Smith - Bushland 230kV Line Trap		\$200,000.00
Replace Line Traps		
GEN-2007-034	\$140,690.82	
GEN-2008-009	\$59,309.18	
Total	\$200,000.00	
GEN-2006-006 Interconnection Cost		\$5,447,000.00
See Oneline Diagram		
GEN-2006-006	\$5,447,000.00	
Total	\$5,447,000.00	
GEN-2007-005 Interconnection Cost		\$3,925,014.00
See Oneline Diagram		
GEN-2007-005	\$3,925,014.00	
Total	\$3,925,014.00	
GEN-2007-021 Interconnection Cost		\$3,073,000.00
See Oneline Diagram		
GEN-2007-021	\$3,073,000.00	
Total	\$3,073,000.00	
GEN-2007-025 Interconnection Cost		\$10,732,000.00
GEN-2007-025	\$10,732,000.00	
Total	\$10,732,000.00	

Upgrade Facility	Allocated Costs	E + C Costs
GEN-2007-032 Interconnection Cost		\$2,200,000.00
See Oneline Diagram		
GEN-2007-032	\$2,200,000.00	
	Total	\$2,200,000.00
GEN-2007-034 Interconnection Cost		\$12,892,997.00
See Oneline Diagram		
GEN-2007-034	\$12,892,997.00	
	Total	\$12,892,997.00
GEN-2007-038 Interconnection Cost		\$3,663,731.00
See Oneline Diagram		
GEN-2007-038	\$3,663,731.00	
	Total	\$3,663,731.00
GEN-2007-043 Interconnection Cost		\$8,732,000.00
See Oneline Diagram		
GEN-2007-043	\$8,732,000.00	
	Total	\$8,732,000.00
GEN-2007-044 Interconnection Cost		\$3,073,000.00
See Oneline Diagram		
GEN-2007-044	\$3,073,000.00	
	Total	\$3,073,000.00
GEN-2007-046 Interconnection Cost		\$545,411.00
See Oneline Diagram		
GEN-2007-046	\$545,411.00	
	Total	\$545,411.00
GEN-2007-048 Interconnection Cost		\$3,558,890.00
See Oneline Diagram		
GEN-2007-048	\$3,558,890.00	
	Total	\$3,558,890.00
GEN-2007-050 Interconnection Cost		\$1,214,000.00
See Oneline Diagram		
GEN-2007-050	\$1,214,000.00	
	Total	\$1,214,000.00
GEN-2007-051 Interconnection Cost		\$2,500,000.00
GEN-2007-051	\$2,500,000.00	
	Total	\$2,500,000.00

Upgrade Facility	Allocated Costs	E + C Costs
GEN-2007-052 Interconnection Costs		\$909,000.00
GEN-2007-052	\$909,000.00	
Total	\$909,000.00	
GEN-2007-057 Interconnection Cost		\$450,797.00
See Oneline Diagram		
GEN-2007-057	\$450,797.00	
Total	\$450,797.00	
GEN-2007-062 Interconnection Cost		\$3,807,000.00
See Oneline Diagram		
GEN-2007-062	\$3,807,000.00	
Total	\$3,807,000.00	
GEN-2008-003 Interconnection Cost		\$1,070,000.00
GEN-2008-003	\$1,070,000.00	
Total	\$1,070,000.00	
GEN-2008-008 Interconnection Cost		\$622,212.00
See Oneline Diagram		
GEN-2008-008	\$622,212.00	
Total	\$622,212.00	
GEN-2008-009 Interconnection Cost		\$872,471.00
See Oneline Diagram		
GEN-2008-009	\$872,471.00	
Total	\$872,471.00	
GEN-2008-013 Interconnection Cost		\$9,277,000.00
See Oneline Diagram		
GEN-2008-013	\$9,277,000.00	
Total	\$9,277,000.00	
GEN-2008-014 Interconnection Cost		\$1,872,918.00
See Oneline Diagram		
GEN-2008-014	\$1,872,918.00	
Total	\$1,872,918.00	
GEN-2008-016 Interconnection Cost		\$892,129.00
GEN-2008-016	\$892,129.00	
Total	\$892,129.00	

Upgrade Facility	Allocated Costs	E + C Costs
GEN-2008-017 Interconnection Cost		\$1,900,000.00
See Oneline Diagram		
GEN-2008-017	\$1,900,000.00	
Total	\$1,900,000.00	
GEN-2008-018 Interconnection Cost		\$2,564,167.00
See Oneline Diagram		
GEN-2008-018	\$2,564,167.00	
Total	\$2,564,167.00	
GEN-2008-019 Interconnection Cost		\$3,073,000.00
See Oneline Diagram		
GEN-2008-019	\$3,073,000.00	
Total	\$3,073,000.00	
Grassland Interchange 230/115KV Transformer CKT 1 Replace		\$3,550,000.00
GEN-2008-016	\$3,550,000.00	
Total	\$3,550,000.00	
Medicine Lodge - Wichita 345KV CKT 1		\$90,000,000.00
GEN-2006-006	\$4,580,650.44	
GEN-2007-005	\$3,647,083.30	
GEN-2007-021	\$3,652,761.87	
GEN-2007-034	\$2,438,698.50	
GEN-2007-038	\$4,705,535.57	
GEN-2007-044	\$5,451,883.39	
GEN-2007-046	\$3,752,152.09	
GEN-2007-048	\$6,721,465.14	
GEN-2007-050	\$3,818,953.66	
GEN-2007-051	\$3,222,529.45	
GEN-2007-057	\$615,105.86	
GEN-2007-062	\$18,995,457.15	
GEN-2008-003	\$2,255,639.30	
GEN-2008-008	\$948,705.74	
GEN-2008-009	\$976,320.86	
GEN-2008-014	\$1,947,784.21	
GEN-2008-016	\$3,921,949.41	
GEN-2008-017	\$5,080,494.39	
GEN-2008-018	\$7,814,946.28	

Upgrade Facility	Allocated Costs	E + C Costs
GEN-2008-019	\$5,451,883.39	
Total	\$90,000,000.00	
Spearville - Comanche 345KV CKT 1		\$58,500,000.01
GEN-2006-006	\$12,722,320.64	
GEN-2007-005	\$1,333,153.14	
GEN-2007-038	\$12,846,512.68	
GEN-2007-046	\$1,641,011.99	
GEN-2007-048	\$746,332.33	
GEN-2007-057	\$211,865.01	
GEN-2008-017	\$11,839,839.40	
GEN-2008-018	\$17,158,964.82	
Total	\$58,500,000.01	
Spearville (SPEARVL2) 345/230/13.8KV Transformer CKT 2		\$6,400,000.00
GEN-2006-006	\$6,400,000.00	
Total	\$6,400,000.00	
Stevens County - Gray County 345KV CKT 1		\$70,907,000.00
GEN-2007-005	\$18,704,223.16	
GEN-2007-046	\$20,048,605.79	
GEN-2007-048	\$29,039,553.82	
GEN-2007-057	\$3,114,617.23	
Total	\$70,907,000.00	
Swisher - Amarillo South Line Traps		\$77,464.00
GEN-2007-048	\$77,464.00	
Total	\$77,464.00	
Tolk Station East - TUCO Interchange 230kV CKT 1		\$200,000.00
Replace Line Traps		
GEN-2007-034	\$145,287.34	
GEN-2008-009	\$54,712.66	
Total	\$200,000.00	
Woodward - Sooner Wind 138kV		\$4,500,000.02
GEN-2006-006	\$153,357.84	
GEN-2007-005	\$118,415.82	

Upgrade Facility	Allocated Costs	E + C Costs
GEN-2007-021	\$239,980.75	
GEN-2007-034	\$79,917.93	
GEN-2007-038	\$153,524.03	
GEN-2007-044	\$358,180.22	
GEN-2007-046	\$137,277.77	
GEN-2007-050	\$495,979.51	
GEN-2007-057	\$19,588.76	
GEN-2007-062	\$1,341,913.47	
GEN-2008-003	\$292,946.96	
GEN-2008-008	\$33,178.53	
GEN-2008-009	\$31,916.17	
GEN-2008-014	\$60,472.40	
GEN-2008-016	\$137,137.93	
GEN-2008-017	\$196,941.74	
GEN-2008-018	\$291,089.97	
GEN-2008-019	\$358,180.22	
Total	\$4,500,000.02	
Current Study Upgrades Total		\$490,477,054.04

G: ACCC analysis (no upgrades)

SOURCE	GROUP DISPATCH		ELEMENT	DIRECTION	TC%LOA				CONTNAME
	SCENARIO	SEASON			RATEA	RATEB	DING	TDF	
G08_019	4	10G	'FPL SWITCH - WOODWARD 138KV CKT 1'	'TO->FROM'	133	153	158.7627	0.23592	'NORTHWEST - TATONGA EHV 345.00 345KV CKT 1'
G08_019	5	10G	'FPL SWITCH - WOODWARD 138KV CKT 1'	'TO->FROM'	133	153	215.1727	0.23562	'NORTHWEST - TATONGA EHV 345.00 345KV CKT 1'
G08_019	5	10G	'FPL SWITCH - MOORELAND 138KV CKT 1'	'FROM->TO'	268	287	121.4746	0.23562	'NORTHWEST - TATONGA EHV 345.00 345KV CKT 1'
G08_019	6	10G	'FPL SWITCH - WOODWARD 138KV CKT 1'	'TO->FROM'	133	153	191.3146	0.23582	'NORTHWEST - TATONGA EHV 345.00 345KV CKT 1'
G08_019	6	10G	'FPL SWITCH - MOORELAND 138KV CKT 1'	'FROM->TO'	268	287	108.6685	0.23582	'NORTHWEST - TATONGA EHV 345.00 345KV CKT 1'
G08_019	7	10G	'FPL SWITCH - WOODWARD 138KV CKT 1'	'TO->FROM'	133	153	132.6275	0.23599	'NORTHWEST - TATONGA EHV 345.00 345KV CKT 1'
ADDITIONAL OVERLOADS AT 100% NAMEPLATE (DC ANALYSIS)									
G07_048	5	10G	'G07-48T 230.00 - SWISHER COUNTY INTERCHANGE 230KV CI FROM->TO	319	351	112.2431	1	'AMARILLO SOUTH INTERCHANGE - G07-48T 230.00 230KV CKT 1'	
G07_048	5	10G	'AMARILLO SOUTH INTERCHANGE - G07-48T 230.00 230KV CKT TO->FROM	319	351	112.2111	1	'G07-48T 230.00 - SWISHER COUNTY INTERCHANGE 230KV CKT 1'	
G08_016	6	10G	'GRASSLAND INTERCHANGE 230/115KV TRANSFORMER CKT 1' FROM->TO	115	115	106.3178	0.66331	'GRASSLAND INTERCHANGE - JONES_BUS2 6230.00 230KV CKT 1'	
G07_032	7	10G	CLINTON JUNCTION - G07-32T 138.00 138KV CKT 1	TO->FROM	143	143	105.1893	1	G07-32T 138.00 - CLINTON 138.00 CKT 1
G07_032	7	10G	CLINTON - G07-32T 138.00 138KV CKT 1	FROM->TO	143	143	105.1893	1	G07-32T 138.00 - CLINTON JCT 138.00 CKT 1

H: ACCC analysis (no upgrades) (without Hitchland-Woodward)

