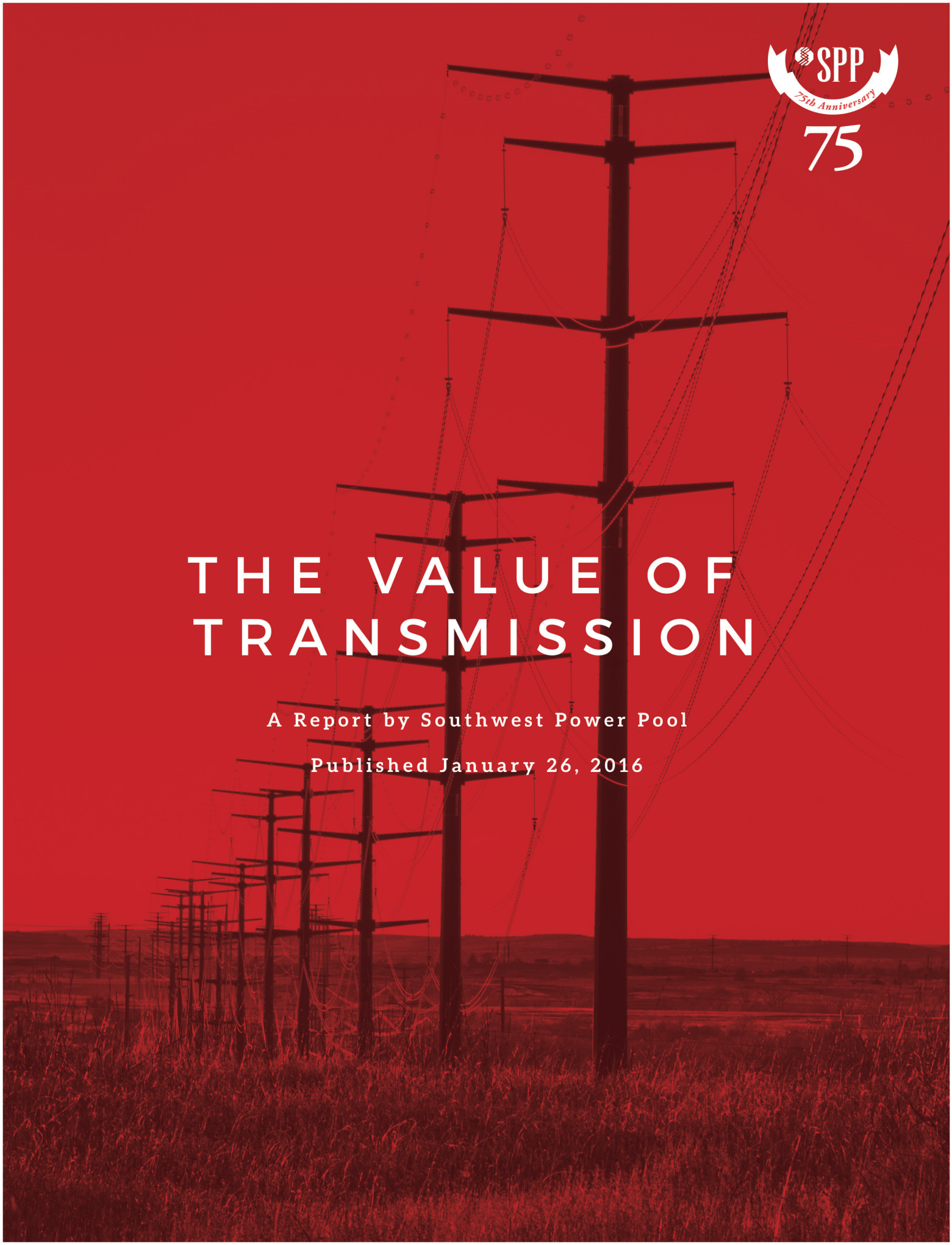

THE VALUE OF TRANSMISSION

A Report by Southwest Power Pool

Published January 26, 2016

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EXECUTIVE SUMMARY

Southwest Power Pool (SPP) has approved the construction of significant transmission expansion since becoming a Regional Transmission Organization (RTO) in 2004. In this report, SPP attempts to quantify the value of transmission expansion projects placed in service from 2012 through 2014. A portion of the value quantified in this report is captured from an analysis of the first year of operation of the Integrated Marketplace (IM) which began March 1, 2014. While many large projects installed in 2012-2014 were not in service at the launch of the IM, their value in the mid-to-late portion of 2014 are partially captured in this assessment and will continue into the future.

Traditional planning studies have previously projected economic benefits of future transmission expansion projects, but a study to quantify the *actual* benefits of major projects in SPP is needed to validate the conclusions and recommendations of prior planning studies.

From 2012 to 2014, SPP installed almost $3.4 billion of transmission expansion projects. These include major Extra High Voltage (EHV) backbone projects approved with SPP's Balanced Portfolio and Priority Projects studies. While these costs are significant, their "bang for the buck" in creating an effective, efficent network in the SPP footprint is also noteworthy. SPP's actual costs to install EHV backbone facilities are roughly one-third the total cost of projects being built and installed by other transmission system operators during the same time period, according to EEI data.

This study determines production cost benefits realized during actual operations resulting from transmission expansion placed into service between 2012 and 2014. These production cost benefits were derived from operational models reflecting a subset of actual system conditions from March 2014 through February 2015. The estimated benefits of production cost savings are significant and higher than planning model projections. Based on actual experience during the Integrated Marketplace's first year, and excluding the full benefits of economically efficient interchange with neighbors, Adjusted Production Cost (APC) savings are calculated at more than $660,000 per day or $240M per year. The net present value (NPV) of these APC benefits is expected to exceed $10 billion over the next 40 years, which compares favorably to an NPV of the projects' costs of less than $5 billion over the same period.

In addition to APC savings, this study also quantified benefits associated with reliability and resource adequacy, generation capacity cost savings, reduced transmission losses, increased wheeling revenues, and public policy benefits associated with optimal wind development. Some sources of additional value, which were either partially captured or excluded altogether, have not been quantified. These include environmental benefits, employment and economic development benefits, and other metrics like storm hardening and reduction in the costs of future transmission needs. The value of these benefits may be large – some even larger than those included in the study. All of these are shown in Appendix B.

BENEFITS OF THESE PROJECTS ... ARE EXPECTED TO EXCEED $16.6B, A BENEFIT-COST RATIO OF 3.5

Overall, the NPV of all quantified benefits for the evaluated projects, including production cost savings, are expected to exceed $16.6 billion over the 40-year period, which results in a Benefit-to-Cost ratio of 3.5.

Following an independent assessment of the Value of Transmission study, the Brattle Group called it "a path-breaking effort" that "provides a more accurate estimate of the total benefits that a more robust and flexible transmission network delivers," concluded that the estimated present value of production cost savings are likely understated and recommended future study refinements. A letter from the Brattle Group with their comments regarding the study is presented on page 25 of this document.

BACKGROUND

SPP staff, its members and stakeholders, and the bulk power industry as a whole have done much work to quantify the benefits of transmission. SPP has been a leader in doing so to justify economic expansion in its footprint. Typical metrics to determine the benefits of transmission expansion include: adjusted production cost savings, reliability and resource adequacy benefits and generation capacity cost savings, market benefits, environmental and public policy benefits, employment and economic stimulus benefits, and other project-specific benefits. However, transmission expansion provides other values in addition to those SPP is able to quantify.

Transmission enables and defines markets. Quantifying the benefits of bulk electric power transmission facilities is as much an art as a science. Planning studies have attempted to quantify the benefits of transmission, but actual system performance demonstrates that real world value provided by additional enabling infrastructure such as transmission is higher than what was originally projected.

While SPP members have approved billions of dollars of investment in transmission expansion to date, it's important that grid enhancements in SPP provide "bang for the buck" in a timely manner. The installed cost per mile of EHV transmission lines and substations in SPP are low compared to transmission facilities of similar design in other regions. More importantly, lead times for long linear projects like major EHV transmission lines crossing multiple jurisdictions can be problematic. SPP and its Transmission Owners have successfully gotten such projects placed in service, with a few exceptions, in noteworthy timeframes. The timely execution of approved plans is the best way to manage risks and uncertainties.

As an RTO, SPP has made significant transmission capacity additions using standard designs for EHV backbone facilities placed in service, both quickly and inexpensively compared to peers. In its most recent *Transmission Projects: At A Glance*[1] report from March 2015 , the Edison Electric Institute (EEI) documents major transmission projects which have been recently completed or are in the process of being implemented.

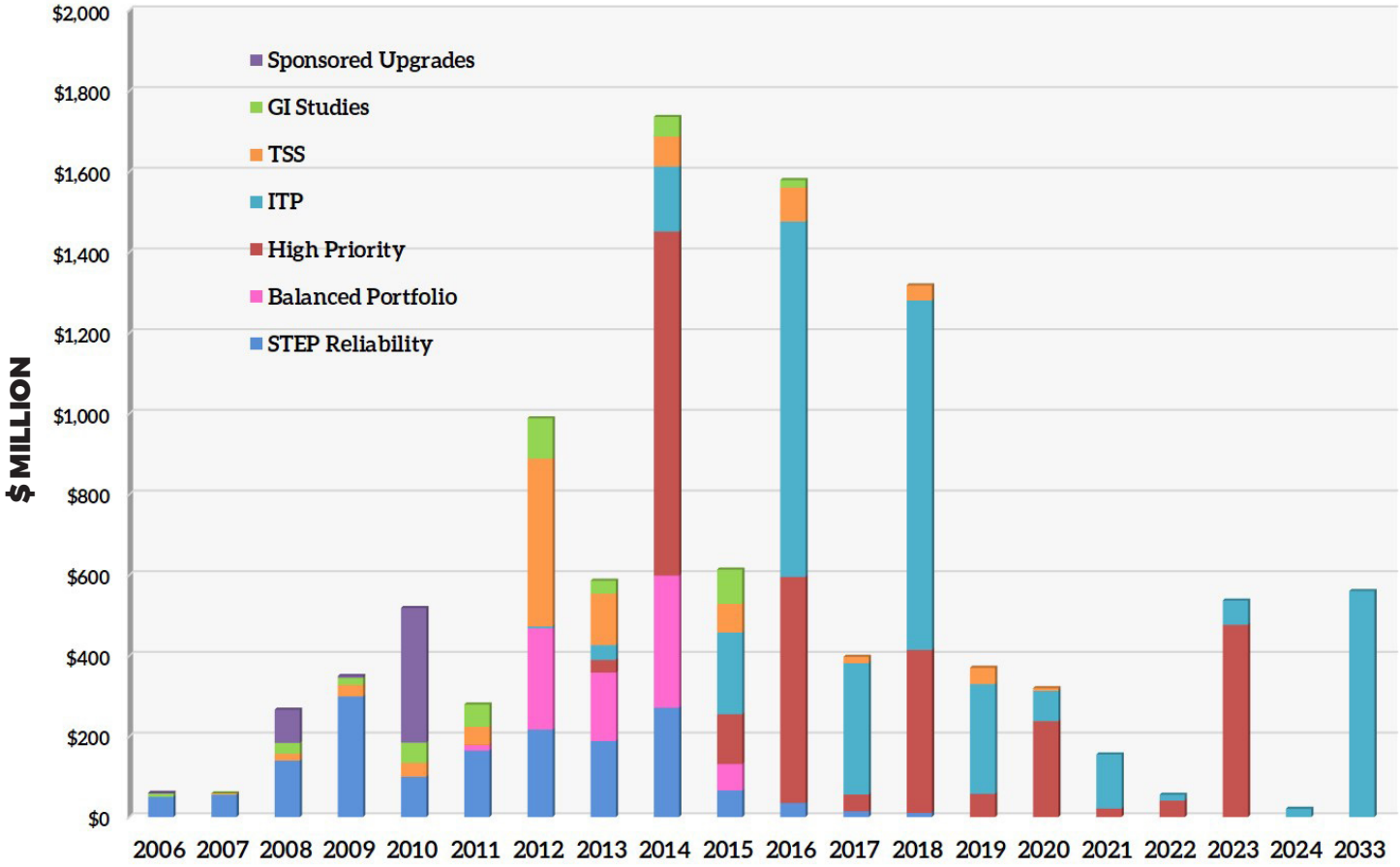
Looking at overhead 345 kV projects, EEI members expect to spend over $10.4 billion for 23 projects representing 3,444 circuit miles of new transmission lines. Non-SPP 345 kV transmission projects among EEI members cost in excess of $3M per circuit mile. In comparison, SPP's 345 kV Balanced Portfolio and Priority Projects installed in 2012-2014 represent an investment of $1.64 billion, provided 1,536 circuit miles of new transmission, and cost just slightly more than $1 million per circuit mile to construct.

Not only are SPP's actual 345 kV construction costs one-third of the cost of peer projects in the EEI report on a circuit mile basis, but SPP builds its EHV network with 3,000-Amp design standards. SPP builds for the future to create an efficient and effective EHV backbone network in the long-term.

Firm data regarding lead time for transmission expansion in SPP compared to other regions are not readily available, but some RTOs experience lead times of 10 years to plan, approve, design, route, permit and install their EHV projects. In contrast, the majority of the SPP Balanced Portfolio and Priority Projects have been placed in service in substantially less time: one factor that drives SPP's cost-per-mile of EHV transmission lower than its peers'.

1 Edison Electric Institute (March 2015), Transmission Projects: At a Glance http://www.eei.org/issuesandpolicy/transmission/Documents/Trans_Project_lowres_bookmarked.pdf

FIGURE 1: TOTAL INVESTMENT PER IN-SERVICE YEAR



Transmission expansion in SPP is shown in Figure 1 and Table 1.

The 345 kV projects considered in this assessment – those installed from 2012 through 2014 – represent more than 1,800 circuit miles of high-capacity backbone facilities that have been integrated into an effective bulk power network. They represent a more-than-25 percent increase in new 345 kV infrastructure, resulting in an improvement in network capability by at least 40 percent based on SPP's approved design standards. Grid expansion in SPP positions us to address uncertainties and capture opportunities in the future and facilitates optimal network performance in the long-term as aging facilities get rebuilt. The SPP EHV overlay and subsequent Integrated Transmission Plan 20-Year Assessments (ITP20) create a visionary, evolutionary plan that moves us away from a "patchwork" grid and toward a more efficient, robust system able to support many potential futures.

It is difficult to monetize the value of enabling infrastructure, especially long-life assets in an industry which typically adjusts slowly to opportunities due to lead times of changes in portfolios, transactions, etc. New transmission is a lumpy investment and a long-life asset that works best as part of an efficient and effective grid that takes decades to plan, design, approve and install.

TABLE 1: TRANSMISSION INVESTMENTS (MILES AND COST) BY VOLTAGE

NEW LINES IN SPP: 2006-2014

Miles

VOLTAGE	2006	2007	2008	2009	2010	2011	2012	2013	2014	TOTAL
69		14.0	25.3	4.5					14.0	129.3
115				8.7	47.4	130.0	23.0	3.7	135.5	486.9
138	30.0	30.0	27.0	13.5	29.0	16.5	50.7	44.9	37.2	339.5
161		12.0		8.0		0.8		14.9	9.0	44.7
230				54.4			63.0	55.0	62.6	276.4
345			14.0	67.0	163.8		527.7	118.0	1170.9	2092.3
Total	30.0	56.0	66.3	156.1	240.2	147.3	664.4	236.5	1429.2	3369.0

Cost

VOLTAGE	2006	2007	2008	2009	2010	2011	2012	2013	2014	TOTAL
69		$9,320,377	$7,590,000						$12,775,975	$113,833,739
115				$2,632,405	$21,858,002	$82,167,931	$39,111,891	$13,379,401	$91,382,532	$352,782,211
138	$24,883,016	$24,560,016	$16,760,000	$17,440,000	$20,202,750	$11,988,400	$36,676,068	$42,152,931	$51,927,755	$291,182,457
161		$9,842,225						$27,154,374	$16,372,087	$53,368,686
230				$21,688,257			$39,757,157	$40,215,864	$97,192,386	$257,361,437
345			$14,405,000		$202,794,938		$598,241,806	$165,000,000	$1,186,747,952	$2,173,865,627
Total	$24,883,016	$43,722,618	$38,755,000	$41,760,662	$244,855,690	$94,156,331	$713,786,922	$287,902,570	$1,456,398,687	$3,242,394,157

REBUILDS IN SPP: 2006-2014

Miles

VOLTAGE	2006	2007	2008	2009	2010	2011	2012	2013	2014	TOTAL
69	5.2	5.9	34.0	35.9	18.6	42.1	60.0	33.4	57.3	367.0
115		1.5	29.2	55.3	26.4	31.2	44.0	80.1	50.1	317.7
138	13.7	0.2	4.8	16.5	20.3	68.9	1.8	86.5	33.2	258.8
161	2.0	20.7	14.7	45.4	12.0	33.9		13.0	6.3	148.0
230										0.0
345										0.0
Total	20.9	28.3	82.7	153.1	77.2	176.0	105.8	213.0	146.7	1091.3

Cost

VOLTAGE	2006	2007	2008	2009	2010	2011	2012	2013	2014	TOTAL
69		$8,322,741	$10,498,991	$14,848,800	$11,905,127	$23,247,319	$41,012,999	$23,460,579	$48,222,740	$237,450,481
115		$3,094,877	$7,326,381	$13,773,487	$22,001,721	$18,652,609	$30,270,320	$32,412,034	$30,875,130	$158,406,558
138	$5,960,000	$85,105	$4,440,000	$13,192,530	$25,392,766	$66,096,701	$4,857,641	$47,572,321	$27,346,650	$208,310,029
161	$640,000	$7,625,399	$6,019,002	$35,810,637	$7,467,000	$13,756,472		$6,782,380	$5,142,363	$83,243,253
230										$0
345										$0
Total	$6,600,000	$19,128,122	$28,284,374	$77,625,454	$66,766,614	$121,753,101	$76,140,961	$110,227,314	$111,586,883	$687,410,320

ALL OTHER PROJECTS IN SPP: 2006-2014

Cost

VOLTAGE	2006	2007	2008	2009	2010	2011	2012	2013	2014	TOTAL
69	$466,765	$969,408	$1,960,847	$2,693,587	$4,504,817	$2,595,970	$4,302,974	$2,508,753	$8,928,440	$36,466,282
115	$6,000,000	$5,613,830	$3,262,050	$126,175,946	$35,360,755	$19,234,043	$27,684,105	$35,855,634	$37,111,929	$362,235,177
138	$3,127,787	$6,008,142	$19,934,672	$10,223,518	$5,830,986	$9,106,223	$35,709,240	$66,788,412	$41,980,747	$239,818,819
161		$2,894,854	$21,806,875	$31,394,877	$18,321,158	$13,397,980	$2,115,237	$10,185,312	$19,163,572	$119,279,866
230		$10,073,312		$26,906,550	$6,858,047	$9,329,355	$35,130,882	$32,222,848	$44,528,599	$206,685,667
345		$8,852,316	$945,625	$15,173,000	$21,851,834	$21,300,052	$63,085,781	$42,330,439	$76,693,251	$366,735,044
Total	$9,594,553	$34,411,861	$47,910,069	$212,567,478	$92,727,597	$74,963,623	$168,028,219	$189,891,398	$228,406,539	$1,331,220,855

TOTAL PROJECTS IN SPP: 2006-2014

Cost

VOLTAGE	2006	2007	2008	2009	2010	2011	2012	2013	2014	TOTAL
69	$466,765	$18,612,526	$20,049,838	$17,542,387	$16,409,944	$25,843,289	$45,315,974	$25,969,332	$69,927,155	$387,750,503
115	$6,000,000	$8,708,707	$10,588,431	$142,581,838	$79,220,478	$120,054,583	$97,066,317	$81,647,069	$159,369,591	$873,423,946
138	$33,970,803	$30,653,263	$41,134,672	$40,856,048	$51,426,502	$87,191,324	$77,242,949	$156,513,664	$121,255,152	$739,311,305
161	$640,000	$20,362,478	$27,825,877	$67,205,514	$25,788,158	$27,154,452	$2,115,237	$44,122,066	$40,678,022	$255,891,804
230		$10,073,312		$48,594,807	$6,858,047	$9,329,355	$74,888,039	$72,438,712	$141,720,985	$464,047,104
345		$8,852,316	$15,350,625	$15,173,000	$224,646,772	$21,300,052	$661,327,587	$207,330,439	$1,263,441,203	$2,540,600,671
Total	$41,077,569	$97,262,601	$114,949,443	$331,953,593	$404,349,901	$290,873,055	$957,956,102	$588,021,282	$1,796,392,109	$5,261,025,333

This engineering analysis is limited in its horizon and cases analyzed, only looking at the actual benefits for the Integrated Marketplace's (IM) first year of operation – March 2014 through February 2015 – for the 348 projects representing $3.394 billion in investment, which were eligible for base plan funding and placed in service between 2012 and 2014. The 2012-2014 Portfolio of Projects evaluated in these 2014 simulations are shown in Appendix B to this study.

The Annual Transmission Revenue Requirement (ATRR) for these projects is approximately $501 million per year at the beginning of 2015 and assumed to depreciate at 2.5% per year over the typical 40-year life of projects. Since many of these projects, especially several of the 345 kV Priority Projects, were installed in the second half of 2014, the actual ATRR going into 2014 is only $316 million, comparable to the benefits quantified in the analyses. For example, the Woodward District EHV – Thistle and Thistle – Clark Co – Ironwood 345 kV projects were not installed until early-November and mid-December 2014, respectively, and only contributed benefits to SPP in terms of quantified production cost savings to a few of the actual 34 operational simulations used in this study.

The Thistle - Clark Co – Ironwood double-circuit 345 kV lines were the final segments of the Priority Projects in the central and south plains of KS, OK and TX which facilitated effective integration of renewables and developed a robust network integrating western SPP into the existing EHV systems at Wichita and Oklahoma City. The benefits of the other 345 kV double-circuit Priority Projects in the central and south plains were not fully realized until mid-December 2014.

The benefits quantified in this study reflect average-study-year APC savings, compared to 2014 year-end costs.

While planning studies reflect perfect foresight and no uncertainty, actual system operations will see events due to human or mechanical issues and natural phenomena like weather fronts that create opportunities to improve the efficiency and overall effectiveness of grid operations that can only be captured with a robust transmission network. Such assumptions in modeling and analyses need to be considered in any valuation study. For example, SPP's projections of the Integrated Marketplace benefits were half of those actually realized during the market's first year. Similar adjustments would not be unreasonable in engineering analyses attempting to quantify the value of transmission using models.

ANALYSIS APPROACH

ADJUSTED PRODUCTION COST SAVINGS

REDUCED PRODUCTION COSTS DUE TO LOWER UNIT COMMITMENT, ECONOMIC DISPATCH, AND ECONOMICALLY EFFICIENT TRANSACTIONS WITH NEIGHBORING SYSTEMS

Actual operational models for the Integrated Marketplace's first year were used to quantify production cost impacts due to lower unit commitment and dispatch costs for SPP resources to serve SPP obligations in five highest production cost days and five lowest production cost days in each season.

The modeling results for those simulations that show production cost savings are shown in Table 2.

To determine annual production cost savings based on these daily actual operational models, SPP validated the model results prior to any extrapolation efforts. Of the 40 days simulated, the models were not able to solve in two days (results shown as N/A) and showed negative benefits in four days.

Operations staff found that a refined simulation would result in significant positive benefits in these six days if a local modeling issue was resolved. Hence, results with N/A and negative values were considered as outliers, thus not included in average daily savings calculations.

As a final note, these analyses focused on new projects and did not capture the incremental capacity associated with transmission rebuilds and transformer upgrades which did not affect system topology. These rebuilds and upgrades to existing facilities are important and provide value but are not incorporated into this analysis and savings calculation.

TABLE 2: PRODUCTION COST SAVINGS

DATE	SEASON	HIGH/LOW PROD. COST DAY	TRANSMIS-SION VALUE
3/10/2014	Winter	Low	255,945
3/11/2014	Winter	Low	(79,548)
3/13/2014	Winter	Low	357,094
3/20/2014	Winter	Low	798,336
3/21/2014	Winter	Low	603,442
3/22/2014	Spring	Low	N/A
3/30/2014	Spring	Low	579,521
4/12/2014	Spring	Low	783,220
4/19/2014	Spring	Low	783,096
4/29/2014	Spring	Low	372,534
5/29/2014	Spring	High	(122,468)
5/30/2014	Spring	High	340,300
6/4/2014	Spring	High	609,492
6/5/2014	Spring	High	1,485,418
6/19/2014	Spring	High	917,044
6/27/2014	Summer	Low	575,763
7/4/2014	Summer	Low	968,855
7/22/2014	Summer	High	2,011,082
7/23/2014	Summer	High	(409,467)
8/18/2014	Summer	High	781,603
8/25/2014	Summer	High	1,107,308
8/26/2014	Summer	High	906,053
9/12/2014	Summer	Low	521,871
9/13/2014	Summer	Low	44,407
9/14/2014	Summer	Low	704,028
10/12/2014	Fall	Low	515,607
11/2/2014	Fall	Low	N/A
11/9/2014	Fall	Low	337,043
11/13/2014	Fall	High	988,642
11/19/2014	Fall	High	2,150,285
12/1/2014	Fall	High	475,844
12/3/2014	Fall	High	161,933
12/13/2014	Fall	Low	386,676
12/14/2014	Fall	Low	428,725
12/18/2014	Fall	High	175,688
1/1/2015	Winter	High	174,185
1/9/2015	Winter	High	383,485
1/13/2015	Winter	High	190,194
1/14/2015	Winter	High	(254,537)
2/27/2015	Winter	High	640,288

Table 3 displays the count of data points used to achieve simple average seasonal daily savings figures after removing outliers (i.e., those with N/A and negative results).

TABLE 3: NUMBER OF DATA POINTS

# OF DATA POINTS	HIGH	LOW	TOTAL
Fall	5	4	9
Spring	4	4	8
Summer	4	5	9
Winter	4	4	8
TOTAL	**17**	**17**	**34**

In this process, simple averages were calculated from the data in Table 2, as shown in Table 4.

TABLE 4: SIMPLE AVERAGES

SEASON	HIGH	LOW
Fall	$790,478	$417,013
Spring	$838,064	$629,593
Summer	$1,201,512	$562,985
Winter	$347,038	$503,704
High/Low Simple Averages	$794,273	$528,324
ANNUAL AVERAGE DAILY SAVINGS (SIMPLE AVERAGE)	**$661,298**	

A simple average of the production cost savings across each seasonal high and low production cost day indicates $661,298 of daily benefits to SPP for the first year of the IM beginning in March 2014. In future studies, it may be desirable to simulate more than 40 days (including different types of days, such as high/average/low congestion days) to represent a full 12-month period and use a study period during which all of the evaluated transmission project would have been in service.

Extrapolating the average daily savings of $661,298 per day to the first year of the Integrated Marketplace (March 2014 through February 2015) results in an Annual Production Cost Savings of $241.3 million associated with the 2012-2014 transmission expansion projects in SPP.

Production cost savings can be expected to increase over time, particularly since the majority of the large EHV upgrades associated with the Balanced Portfolio and Priority Projects were added in the latter half of the production cost simulations. The 2012-2014 EHV projects installed in SPP were arguably unprecedented in terms of long-term impacts to improve grid performance and capabilities. In the 2015 ITP10 study, the annual APC savings increased by 16.5 percent per year on average, based on the different study year models. In the most recent ITP20 study, the annual APC savings increased by 29.1 percent per year on average. For this analysis, we assume that production cost savings will escalate at a rate of 10 percent per year.

The growth of APC savings over time is driven by increasing load, additional generation, and higher fuel costs in future years, which combine to cause more congestion. Transmission system topology remains essentially unchanged, but load, generation, and fuel costs change significantly over the study horizons.

With load growth, inefficient gas resources are dispatched more frequently and system marginal costs grow, which increases APC at rates higher than forecasted natural gas prices. Natural gas prices are projected to increase at 3-7 percent per year in our models, which includes growth and inflation. While natural gas prices are projected to grow at rates higher than escalation, that factor by itself is not a significant driver of APC benefit growth compared to how load and generation changes, which can be expected over the study horizon.

Economic planning studies typically identify APC savings that include the impacts of power purchases and sales between the study region and its neighboring regions. In the SPP analyses performed by the Operations staff, power transactions were assumed to be constant between the two cases simulated (with and without projects). This approach understates the value of grid expansion with respect to opportunities to reduce capacity and energy costs for purchases from adjacent regions, as well as increased revenues associated with sales to adjacent regions. More specifically, typical APC values would include the impacts associated with the ability to purchase from more suppliers at a cheaper cost or sell to more buyers at a higher price. While not reflected in these modeling results, these impacts to transactions with adjacent systems can be attributed to more enabling infrastructure to market participants, which creates efficiencies and real benefits to wholesale and retail consumers.

Actual production cost savings are typically larger than those projected in planning simulations, which is consistent with analyses conducted by Brattle and others. Transmission capabilities are most valued in extreme market conditions and events which were not captured in planning analyses, but occur in actual system operations.

Weather events such as the Polar Vortex of 2014, which occurred prior to the IM and was not captured in this study horizon, resulted in unprecedented peak system demands while fuel supplies were disrupted and generating resources failed to operate due to extreme cold weather. The value provided by the interconnected transmission system during those extreme events is often much larger compared to normal conditions. The insurance value of additional transmission capability is difficult to quantify and has not been reflected in these analyses since the market simulations typically assume perfect foresight and the study period does not include any major extreme events.

Consumers also benefit from lower production costs resulting from transmission expansion projects. Southwestern Public Service/Xcel Energy announced in a news release on September 10, 2015:

> *Lower fuel and purchased power costs are leading Xcel Energy to refund $18.6 million to Texas retail customers, a move driven by continued low natural gas costs and cheaper power imports into the Panhandle and South Plains made possible by new transmission line connections.*
>
> *Beginning in November, Texas residential customers using 1,000 kilowatt-hours per month will see a one-time credit, prorated over two billing cycles for most customers, amounting to $34.42.*
>
> *David Hudson, president of Southwestern Public Service Company, an Xcel Energy company, said hundreds of millions of dollars have been invested in the transmission system, and new lines connecting Xcel Energy with the Southwest Power Pool have expanded the purchase of competitively priced power. In addition, natural gas prices remained very low through the first part of this year.*
>
> *The company lowered its fuel and purchased power cost factors in March, which resulted in ongoing residential customer savings of $7.*

ADDITIONAL PRODUCTION COST SAVINGS

The Adjusted Production Cost estimates obtained from traditional planning studies fail to capture the full range of the production cost savings provided by transmission investments due to the simplified nature of the market simulations used in planning studies. For example, planning studies typically do not consider the effect of multiple, concurrent transmission outages, the impact of new transmission facilities on the annual transmission-related energy losses, or the fact that real-time loads and intermittent generation output is uncertain on a day-ahead basis. To capture these additional production cost savings in planning studies typically requires additional analysis. In contrast, SPP's methodology to estimate production cost savings based on the re-run of its entire day-ahead and real-time market fully or partially captures many of these benefits as summarized below.

(A) IMPACT OF GENERATION OUTAGES AND A/S UNIT DESIGNATIONS

SPP's methodology relies on the re-run of its day-ahead and real-time energy and ancillary services markets, including actual generation outages and generation capability used to provide ancillary service. As a result, this benefit has been captured in the APC savings which were quantified in this Value of Transmission assessment.

(B) REDUCED TRANSMISSION ENERGY LOSSES

SPP's market software fully considers hourly energy losses and how they are affected by the outage or addition of transmission facilities. As a result, this benefit (i.e., the extent to which new transmission facilities can reduce energy losses) has been captured in the APC savings which were quantified in this Value of Transmission assessment.

(C) REDUCED CONGESTION DUE TO TRANSMISSION OUTAGES

The Mitigation of Transmission Outages Costs metric for the ITP planning studies is not applicable since actual outages from the Control Room Operations Window (CROW) system have been included in these operational models and simulations. Despite this, actual outages in operations can be significant and can only be expected to increase in frequency and duration with aging infrastructure and more volatile and extreme weather

patterns. As a result, it is increasingly critical for SPP planning analyses to accurately forecast outages and capture the impacts of this metric in its plans.

The inability to accommodate necessary outages and costs of rebuilding aging transmission assets may warrant the installation of overlay facilities or accelerate the installation of major EHV projects to maintain an efficient and secure network as we create the future grid. With time and load growth, it is increasingly costly and difficult to accommodate necessary maintenance and rebuild outages of major transmission facilities.

(D) MITIGATION OF EXTREME EVENTS AND SYSTEM CONTINGENCIES

The SPP methodology selected five days with the highest production costs for each of the four seasons. To the extent that high production costs during selected days are the result of extreme events and unusually challenging system conditions, this benefit has been partially captured in the APC savings which were quantified in this Value of Transmission assessment. Note that none of the selected days included clearly-identified extreme weather or system conditions, such as those experienced during the 2014 Polar Vortex.

(E) MITIGATION OF WEATHER AND LOAD UNCERTAINTY

The SPP methodology selected 5 days with the highest production costs for each of the four seasons. To the extent that high production costs during selected days are the result of challenging weather conditions and load uncertainty (such as 90/10 peak load conditions), this benefit has been partially captured in the APC savings which were quantified in this Value of Transmission assessment. Note that the days analyzed were not specifically selected based on weather or load conditions. For example, additional benefits would likely be realized in situations such as during 90/10 peak load days or during a heat wave in the southeastern portion of SPP when the northwestern portions of SPP experience more moderate temperatures.

(F) REDUCED COST DUE TO IMPERFECT FORESIGHT OF REAL-TIME SYSTEM CONDITIONS

This metric has not been fully quantified in this assessment. Since the day-ahead market was simulated based on the day-ahead forecasts but the real-time market was simulated based on actuals, this benefit would have been captured in the 40 days simulated.

(G) REDUCED COST OF CYCLING POWER PLANTS

This metric has been partially quantified in this assessment. To the extent that variable O&M expenses are reduced due to less cycling of generators as a result of the 2012 through 2014 projects being included in the 40 operational simulations, this benefit is captured. Increased wear and tear on generating units which results in accelerated equipment replacements and other capital expenditures have not been included in these assessments.

(H) REDUCED AMOUNTS AND COSTS OF OPERATING RESERVES AND OTHER ANCILLARY SERVICES

This metric has been partially quantified in this assessment. Operating reserve requirements were not changed in these simulations to capture the impact of increased transmission capabilities on operating requirements.

(I) MITIGATION OF RELIABILITY-MUST-RUN (RMR) CONDITIONS

This metric has not been quantified in this assessment.

OTHER METRICS

In addition to APC savings, SPP has identified other benefit metrics to quantify the value of transmission projects. Some have been monetized in past and existing ITP10 efforts. The approaches to calculate these metrics have been refined over time as the industry acquires knowledge, data, and tools to more accurately quantify the value of transmission assets. The full set of benefit metrics quantified in the most recent ITP10 study consisted of:

- APC Savings
  - Reduction of Emission Rates and Values
  - Savings Due to Lower Ancillary Service Needs and Production Costs
- Avoided or Delayed Reliability Projects
- Capacity Cost Savings Due to Reduced On-Peak Transmission Losses
- Assumed Benefit of Mandated Reliability Projects
- Benefit from Meeting Public Policy Goals (Public Policy Benefits)
- Mitigation of Transmission Outage Costs
- Increased Wheeling Through and Out Revenues
- Marginal Energy Losses Benefits

A few of those metrics are appropriate to monetize above APC savings in this Value of Transmission study. Some, like emission reductions and values to society, are difficult to monetize and therefore not quantified in this assessment. For this analysis, SPP is focusing on the following additional metrics.

RELIABILITY AND RESOURCE ADEQUACY BENEFITS

(A) BENEFITS OF MANDATED RELIABILITY PROJECTS

This metric reflects the reliability benefits of the transmission projects built to meet transmission reliability standards (i.e., classified as "Reliability Projects" by the ITP Manual). Consistent with the methodologies used in ITP10 and RCAR studies, such reliability benefits are assumed to be equal to the projects' costs. The ATRR associated with the Reliability Projects installed in SPP from 2012 through 2014 is estimated to be $231.4 million in 2015 and then assumed to decline with depreciation over 40 years, which results in an NPV of $2.166 billion.

Setting benefits equal to costs may underestimate the value of reliability benefits, since it implies that reliability standards are not cost effective. Stated another way, it effectively assumes that value of reliability-related costs incurred without reliability upgrades (not meeting reliability standards) is no higher than the cost of the facilities. In fact, the value of reliability can be significantly higher than costs of reliability upgrades. This was demonstrated by the August 2003 blackout, which has been estimated to cost society about $6–$10 billion[2] for that single event.

While the industry has struggled to develop a methodology to quantify benefits of grid reliability improvements through transmission expansion, it is important to note that Westar has reported a 40% reduction in transmission Customer Average Interruption Duration Index (CAIDI) and System Average Interruption Duration Index (SAIDI) associated with transmission expansion[3], and the need to value enhanced grid security and resiliency.

While reliability metrics like CAIDI an SAIDI are critically important performance measures for distribution systems, and radial or normally-open loops for transmission and sub-transmission systems, these metrics are valuable in improving operational efficiencies with regards to optimal scheduling of maintenance outages for bulk power system networks. Shorter durations of outages for transmission facilities limit the risk and exposure of customers to outages and the reliability problems that result from them, as well as dispatch of emergency generators or curtailments of interruptible loads which can be costly.

Outages of aging infrastructure to inspect and replace components of transmission facilities will become increasingly necessary and more expensive with time. It's no coincidence that FERC is proposing transmission

2 "Transforming the Grid to Revolutionize Electric Power in North America," Bill Parks, U.S. Department of Energy, Edison Electric Institute's Fall 2003 Transmission, Distribution and Metering Conference, October 13, 2003 and ICF Consulting, "The Economic Cost of the Blackout: An Issue Paper on the Northeastern Blackout, August 14, 2003."

3 "SPP Board Update: Customer impact due to building a more integrated, efficient grid", Westar Energy, June 8, 2015

investment metrics to help the bulk power industry quantify the value of major transmission projects.

(B) AVOIDED/DEFERRED RELIABILITY PROJECTS

This metric captures the reliability benefits of economic transmission projects based on the avoided cost of delaying or avoiding reliability projects. Resources were not available to remove Economic Projects in this 2012-2014 portfolio and determine reliability needs based on traditional N 1 overloads and voltage deficiencies. However, for this benefit metric, the results from a recent SPP staff analysis were used to estimate first-year benefits of $14.9 million and 40-year NPV benefits of $105 million associated with reliability projects that were avoided or deferred as a result of the Priority Projects.

(C) REDUCED LOSS OF LOAD PROBABILITY OR REDUCED PLANNING RESERVE MARGIN (2 PERCENT ASSUMED)

The long-term benefits of an efficient bulk power integration and delivery network are difficult to quantify but significant. The ability to lower planning reserve margins in a region is driven largely by resource and load diversity as well as the network's ability to accommodate outages, integrate resources and maintain system reliability and security above minimum standards.

The projects installed in 2012-2014 represent a substantial portion of the new EHV backbone facilities that have been approved since SPP became an RTO. Lower planning reserve margins can be attributed to significant transmission expansion, as well as market enhancements and organic footprint growth, providing more diversity. This diversity will improve system performance and result in lower loss of load probabilities, as well as loss of load expectations, in SPP. Lower reserve margins within SPP will occur primarily due to 2012-2014 transmission projects evaluated in this study.

Using ITP10 assumptions and reasonable engineering judgment, it can be demonstrated that each percent decrease in planning reserve margins in SPP are worth approximately $50 million per year in reduced costs. Reducing reserve margins by one percent in SPP, approximately a 50 GW system, would lower capacity needs by 500 MW. Marginal capacity costs are estimated to be $81.9/kW-yr in ITP10 based on the Net Cost of New Entry (CONE) for a gas-fired combustion turbine (CT).

So as to not overstate the reserve margin impacts associated with the noted transmission expansion projects, the benefits of a two-percent reduction in SPP's planning reserve margin for this Value of Transmission study is based on the methodology used in the ITP10, which only considers the avoided capacity costs of new resources, and not other related costs to integrate or support the capacity resource additions. As a result, this Value of Transmission study only reflects $94.5 million in cost savings starting in 2017. Those benefits are included in the quantified reliability metrics, along with mandated reliability project benefits and avoided/deferred reliability projects.

The 40-year NPV of benefits associated with a two-percent reduction in planning reserve margins starting in 2017 is estimated to be $1.354 billion assuming that the annual savings would grow at an inflation of 2.5% per year.

GENERATION CAPACITY COST SAVINGS

(A) CAPACITY COST BENEFITS FROM REDUCED ON-PEAK TRANSMISSION LOSSES

While lower unit commitment and energy dispatch costs are captured in production cost simulations and APC savings, the addition of new transmission capacity could also improve the overall system efficiency by reducing system losses. Such reduction in losses during on-peak hours provide capacity cost savings due to lower generation capacity needed. These benefits are captured in this assessment based on the analysis of actual 2014 system peak hour, which occurred on July 22, 2014.

The Operational model simulations showed that the addition of the transmission projects built in 2012-2014 has reduced SPP's system losses by 43 MW during the 2014 system peak hour. Using ITP-approved calculations and assumptions, the capacity cost savings from reduced on-peak losses for the 2012-2014 portfolio of projects is estimated to be about $4 million per year, which is then

escalated at 5% per year over time. The 40-year NPV of these capacity cost benefits is $92 million.

(B) DEFERRED GENERATION CAPACITY INVESTMENTS

This metric has not been quantified in this assessment. A more robust transmission grid may allow utilities to defer generation capacity investment by relying on market purchases of generation capacity in other zones (or even outside the SPP footprint) that are made deliverable by the transmission upgrades. SPP staff has not analyzed the extent to which this benefit is realized by the evaluated portfolio.

(C) ACCESS TO LOWER-COST GENERATION RESOURCES

This metric has only been partially captured in this assessment. To the extent that the transmission upgrades have allowed wind generation to be located in lower-cost/higher-capacity-factor locations, that benefit has been captured in the analysis of Public Policy Benefits below. Not included are the extent to which the more robust transmission grid allows conventional generating plants to be built in lower-cost locations (e.g., at locations with lower-cost sites or access to lower-cost fuel supply).

MARKET BENEFITS

A more robust transmission grid reduces transmission congestion and allows more suppliers and buyers to reach the available trading locations. The associated increase in competition and market liquidity offers a wide range of benefits, such as reduced bid-ask spreads of bilateral transactions, reduced price and deliverability risks associated with market transactions, and the availability and forward-horizon of financial hedging products (such as forwards and futures).

(A) INCREASED COMPETITION

This metric has not been quantified in this assessment.

(B) INCREASED MARKET LIQUIDITY

This metric has not been quantified in this assessment.

OTHER BENEFITS

(A) STORM HARDENING

This metric has not been quantified in this assessment. The focus on grid resiliency and need for effective system restoration plans are predicated on risk management of long lead time components of the bulk power system, like EHV autotransformers. This is becoming increasingly important with aging infrastructure and the difficulties in taking outages to rebuild/replace existing assets which are key elements of the bulk power network.

(B) FUEL DIVERSITY

This metric has not been fully quantified in this assessment. Some benefits of fuel diversity may have been partially captured to the extent that fuel diversity in the integrated footprint was enhanced as a result of the transmission expansion projects installed from 2012 through 2014.

(C) SYSTEM FLEXIBILITY

This metric has not been fully quantified in this assessment. Some benefits of increased system flexibility may have been partially captured to the extent that system flexibility in the integrated footprint was enhanced as a result of the transmission expansion projects installed from 2012 through 2014.

(D) REDUCING THE COSTS OF FUTURE TRANSMISSION NEEDS

This metric has not been quantified in this assessment. The extent to which the transmission upgrades evaluated avoided or reduced the costs of future transmission upgrades has not been captured.

(E) INCREASED WHEELING REVENUES

Additional long-term firm transmission reservations for exports from SPP have been enabled by the 2012-2014 portfolio of projects evaluated in this study. In the past several years, SPP has approved about 800 MW of long-term firm transmission exports which provided $100 million of additional annual wheeling revenues to offset wholesale transmission costs.

Leveraging prior analyses from SPP staff and applying those results to the specifics of this assessment, SPP

estimated that the annual wheeling revenues associated with these projects during the first year of the IM would be $43.3 million with a 40-year NPV value of $1.133 billion. The $43.3 million annual benefit is based on MW of Firm PTP Transmission Service sold and revenues based on Schedules 7 and 11 of the SPP OATT. This credit is shown as the "wheeling" benefits in the Value of Transmission study.

Pricing of export services in SPP needs to reflect the true cost of those services, which should include appropriate contributions to offset a portion of major system enhancements. Many of these large, high-capacity projects in the 2012-2014 portfolio enable those transactions.

(F) HVDC OPERATIONAL BENEFITS

This metric is not applicable to SPP at this time, although substantial opportunities to upgrade, rightsize and potentially bypass existing HVDC ties between SPP and our neighboring systems in the Western Electricity Coordinating Council (WECC) and ERCOT, will be facilitated to a large extent by the substantial EHV network capabilities that have been installed in SPP from 2012 through 2014.

ENVIRONMENTAL BENEFITS

(A) REDUCED EMISSIONS OF AIR POLLUTANTS

This metric has not been quantified in this assessment. However, the 2012-2014 transmission portfolio has facilitated emissions reduction by (a) reducing or entirely eliminating curtailment of wind resources and (b) the development and integration of additional renewable resources.

(B) IMPROVED UTILIZATION OF TRANSMISSION CORRIDORS

This metric has not been quantified in this assessment. It is likely, however, that large, high-capacity transmission projects in the 2012-2014 portfolio utilize transmission corridors more effectively than smaller, incremental upgrades that would be required over time.

PUBLIC POLICY BENEFITS

(A) OPTIMAL WIND GENERATION DEVELOPMENT

The benefits of enabling renewable resource development have not been captured to a large extent in this study. Transmission is necessary and very effective in integrating renewable resources and creating value for these resources across the broad geographic footprint of SPP. The Integrated Marketplace, with its Consolidated Balancing Authority (CBA), helped with the integration of renewable resources, which was realized as a result of installed, enabling infrastructure.

In retrospect, 187 MW of new wind farms installed in 2014 would not have been interconnected to SPP absent the evaluated transmission projects. New wind farms are projected to cost $1400/kW per year based on Lazard estimates being used in the ITP10. The avoided or opportunity costs, as well as economic development and jobs associated with those projects, which represent almost a direct investment of $300 million in SPP, are large and do not count multiplier impacts for indirect benefits. None of these impacts have been quantified or included in the benefits portions of this analysis.

Operational analyses have been used to project the amount of wind curtailments avoided, based on an average of 255 MW of wind curtailments without the noted transmission expansion projects. Without considering energy value and the impact on lower market prices, 2.2 million MWh of wind curtailments annually equates to $30-60 million in lost revenue to developers/generators in terms of Production Tax Credits (PTCs), etc. The actual value of lost wind production to developers/generators are driven by federal, state and local programs and data to identify specific costs and are not available from the analyses performed. While this lost revenue does not provide a direct benefit to consumers like other metrics, it does improve the bottom line to resource providers and can be expected to translate into lower costs to consumers in the long run since all costs and revenues to producers will ultimately be seen over time by consumers in an efficient market.

A robust system also enables the effective integration and delivery of renewables across a broad geographic area. SPP is blessed with high quality wind and solar renewable resources. The diversity of those resources increases their aggregate capacity contribution, which

is additional value that SPP's efficient and effective transmission network provides to our members and customers. Other ISO/RTOs have attempted to quantify the benefits of transmission expansion to allow members and customers access to higher quality renewable resources. Although the Balanced Portfolio and Priority Projects installed in 2012 through 2014 have enabled the integration of higher quality renewables to SPP customers, the associated incremental value has not been fully monetized in this assessment.

For the purposes of this study, the optimal wind development benefits are quantified as the avoided wind investment and local transmission costs. Estimating that the transmission expansion during 2012-2014 has enabled the development of approximately 5,000 MW of higher quality wind resources with an improvement in capacity factor, SPP staff estimated the avoided wind investment costs to be about $22 million per year, which equates to an NPV of $285 million over 40 years. Additionally, the 2012-2014 projects also help avoid the higher local transmission costs that would have been necessary to integrate wind resources located closer to the buyers' load centers. At an estimated cost of $180/kW-wind, the avoided local transmission cost benefit is estimated at $77 million per year, which equates to an NPV of $998 million over 40 years.

(B) OTHER BENEFITS OF MEETING PUBLIC POLICY GOALS

This metric has not been quantified in this assessment. For example, it is expected that a more robust transmission system created by the portfolio of transmission upgrades evaluated in this study will reduce the compliance cost related to the future implementation of new environmental regulations (such as EPA's Clean Power Plan).

EMPLOYMENT AND ECONOMIC DEVELOPMENT BENEFITS

(A) INCREASED EMPLOYMENT AND ECONOMIC ACTIVITY; INCREASED TAX REVENUES

This metric has not been quantified in this assessment. SPP and others have attempted to quantify these benefits in the past. These benefits can be large, particularly considering the high-quality, renewable generation developed in the central and south plains of the United States, enabled by SPP's Balanced Portfolio and Priority Projects. SPP has not monetized the value of increased employment and economic activity or increased tax revenues associated with investment in excess of $3.4 billion from 2012 through 2014 for transmission infrastructure in SPP.

Appendix B summarizes the metrics and quantified benefits in terms of NPV for the SPP transmission expansion projects placed in service over the period 2012 through 2014 based on the first full year of the Integrated Marketplace from March 2014 through February 2015.

SUMMARY

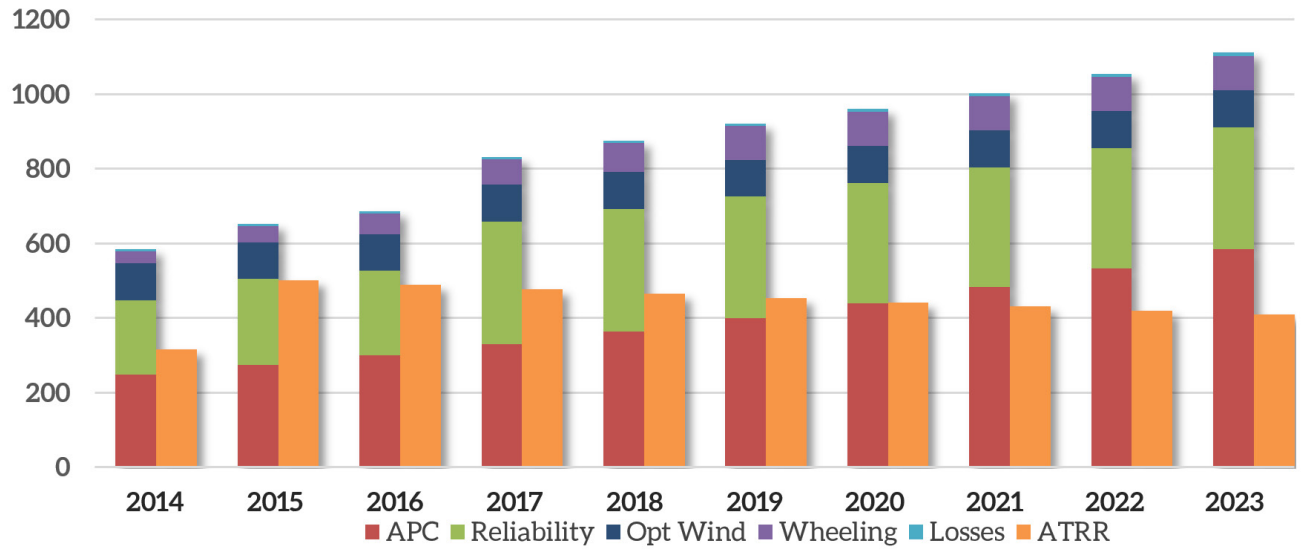
The quantified benefits as part of this Value of Transmission assessment for SPP transmission expansion projects installed from 2012 through 2014 based on the first year of the Integrated Marketplace are summarized in Table 5 and Figure 2 (in millions of nominal year dollars). Note that the benefits shown only capture metrics that have been quantified in this assessment.

Based on this analysis and quantified metrics, Net Present Value (NPV) benefits are substantial. This study contemplated a 40- year planning horizon with an eight-percent discount rate. Based on actual operations in the first year of SPP's Integrated Marketplace and using conservative approaches and assumptions, these projects are expected to provide a benefit-cost ratio of 3.5 to 1.

TABLE 5: VALUE OF TRANSMISSION BASED ON QUANTIFIED BENEFITS*

YEAR	APC	RELIABILITY	WHEELING	ON-PEAK LOSSES	OPTIMAL WIND	TOTAL VALUE	COSTS ATRR
2014	241.4	199.9	31.3	4.0	99.0	575.6	316.4
2015	265.5	231.4	43.3	4.1	99.0	643.3	501.3
2016	292.1	225.6	55.3	4.4	99.0	676.4	488.8
2017	321.3	328.3	67.3	4.6	99.0	820.4	476.6
2018	353.4	328.4	79.2	4.8	99.0	864.8	464.6
2019	388.7	325.6	91.2	5.0	99.0	909.6	453.0
2020	427.6	323.0	91.5	5.3	99.0	946.4	441.7
2021	470.4	320.6	91.7	5.6	99.0	987.3	430.7
2022	517.4	323.6	92.0	5.8	99.0	1,037.8	419.9
2023	569.1	326.8	92.3	6.1	99.0	1,093.3	409.4

FIGURE 2: QUANTIFIED BENEFITS* AND COSTS FOR 2014-2023



** Conservative benefits reflect average APC savings compared to year-end costs.*

TABLE 6: NET PRESENT VALUE (NPV) OF STUDY METRICS

METRIC*	NPV ($M)
APC	10,470
Reliability – Mandated	2,166
Reliability – 2% RM	1,354
Reliability – Avoided/Def	105
Losses	92
Wheeling	1,133
Opt Wind	1,283

Quantified Benefits	16,603
Cost (ATRR)	4,751
B/C	3.5

** Conservative benefits using quantified metrics and average APC savings compared to year-end costs.*

Escalation and discount rates have a major impact on NPVs. A 2.5 percent escalation rate and an eight-percent discount rate have typically been used by SPP in performing calculations for long-term planning studies, and have been incorporated in this analysis.

Some would argue that EHV transmission is a long-term, enabling infrastructure that provides public good and should be assessed at a lower "societal" discount rate, which would be in the range of 3-5 percent per year. Applying a societal discount rate to the portfolio of transmission projects would significantly increase the B/C ratio shown above.

TRANSMISSION BENEFITS BEYOND THE QUANTIFIED METRICS ARE SIGNIFICANT

In the recent WIRES–sponsored Brattle Group report: Toward More Effective Transmission Planning: Addressing the Costs and Risks of an Insufficiently Flexible Electricity Grid [4], the authors noted that one of the three deficiencies that expose markets to higher risks and overall costs is that "planners and policy makers do not consider the full range of benefits that transmission investments can provide and thus understate the expected value of such projects."

EHV grid expansion, which results from coordinated transmission planning in SPP, is partially responsible for footprint expansion. The KETA 345 kV line was the best solution for Kansas renewable development and became part of the Balanced Portfolio, which facilitated organic growth of the SPP footprint to include the Nebraska entities in 2009.

Transmission is a multi-faceted asset in that it not only improves grid security and system reliability but also facilitates more efficient operations and maintenance of the network and power supply assets. This effectively integrates and enhances the value of renewable resources and provides optionality for the future grid, which faces a myriad of uncertainties. The Tuco – Yoakum – Hobbs 345 kV project in High Priority Incremental Load Study (HPILS) not only improved the design and lowered the costs of a previously approved ITP solution, but also will facilitate the effective integration of the best solar resources in the entire Eastern Interconnection.

Transmission planning at SPP has been very effective to date. Although existing transmission planning processes are agile and transparent, continuous improvements are expected as a result of the efforts of the Transmission Planning Improvement Task Force (TPITF).

Aging infrastructure and the ability to accommodate transmission outages without adversely impacting grid operational efficiencies is a challenge with least-cost incremental planning based on pristine models. This value will increase significantly with time.

The benefits of grid expansion are cumulative and cannot be captured in incremental, snap-shot analyses. Standardization for backbone facilities and development of an efficient network will create significant benefits in reduced reserve margins over broad footprints with diverse resources and needs. The ability to effectively address supply adequacy needs is critically dependent upon network design and capabilities.

4 Pfeifenberger, J., Change, J., and Sheilendranath, A. (2015). The Brattle Group: Toward More Effective Transmission Planning: Addressing the Costs and Risks of an Insufficiently Flexible Electricity Grid.

Planning a cost effective and reliable bulk power integration and delivery system in advance of implementing market mechanisms to capture efficiencies is a critical success factor. This is especially true for long-life infrastructure projects which provide optionality for resource planning decisions. Others have struggled to expand transmission capabilities after markets were placed in service.

The success of the South Central Electric Companies (SCEC) in the early 1960s is important to note because it demonstrated how utilities could go beyond joint planning to the installation of EHV backbone facilities based on common design standards which lowered costs and facilitated maintenance and outage restoration. The SCEC built a 500 and 345 kV EHV network to support 1,500MW of seasonal diversity exchanges between the winter peaking TVA system with SPP members in AR, LA, OK, KS, MO and TX that were summer peaking. The SCEC facilities became the backbone for many utilities, not just a way to share diverse capacity and energy among neighboring systems, but also to enable tremendous economies of scope and scale and timely integration of new resource additions in the 1970s and beyond. Those 500 and 345 kV facilities provide tremendous value to current and future customers and will continue to be invaluable for many decades to come.

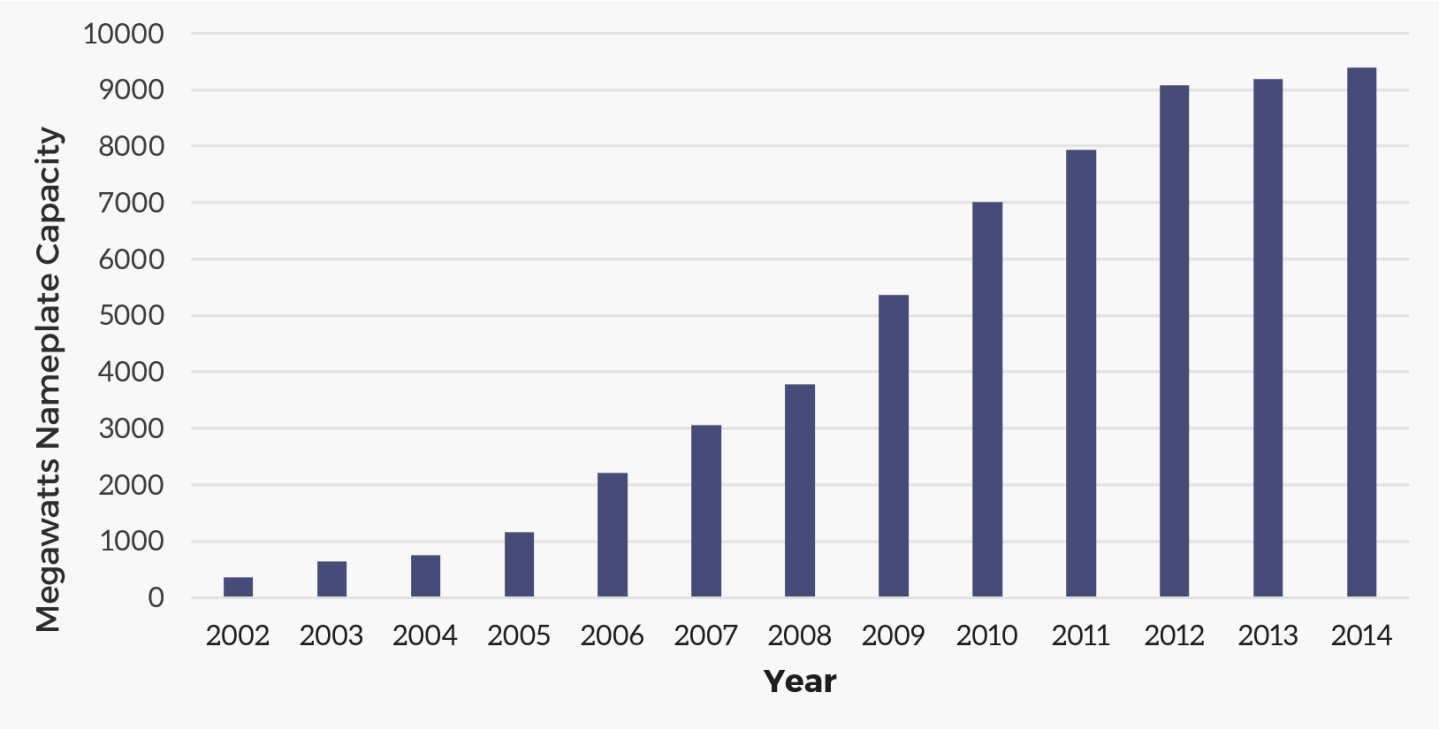
The magnitude of transmission facilities which will require rebuilds in the next twenty years is unknown. While significant rebuilds of 69-161 kV facilities have been accomplished since 2006 (as shown in Table 1), SPP has yet to experience the need to rebuild EHV facilities. Projects like the Wichita – Reno Co – Summit 345 kV expansion by Westar in central Kansas have been facilitated to a large extent by the need to rebuild aging 115 kV and 138 kV facilities and the ability to accommodate EHV expansion using double circuit towers in the existing rights-of-way.

The Integrated Marketplace in SPP has lowered operating costs and reserve requirements for its members as a result of enabling infrastructure and market rules, which are predicated on adequate transmission capability.

While lower losses and improved system efficiencies due to transmission expansion can be monetized in terms of unit commitment, system dispatch and off-system transactions, SPP has not quantified the environmental benefits of improved operations or the more effective integration of renewables in SPP for consumption, both within the SPP footprint and to support transfers to neighboring systems.

The environmental, public policy, and employment and economic stimulus benefits of transmission expansion projects can be large. The benefits of renewable developments and the resulting environmental benefits in SPP are hard to quantify for consumption within the footprint. Recently, renewable developments in SPP are being made to support exports to adjacent systems which are predicated on adequate transmission capacity to support deliveries. Pricing of transmission service needs to assign appropriate portions of backbone system facilities that are required to accommodate effective and efficient deliveries to adjacent systems.

FIGURE 3: WIND ADDITIONS IN SPP



Cumulative wind developments within SPP are shown in Figure 3.

Although 2015 data is not shown in Figure 3, significant wind resources are being installed in SPP in 2015 with minimal incremental transmission expansion beyond the projects completed in 2012 through 2014. SPP's experience shows that transmission expansion enables development of the best wind resources, and one would expect the same for solar resources in the future, as witnessed by recent Generation Interconnection (GI) queue developments.

Economies of scale are expected to persist for renewable resources. Larger scale wind and solar projects are cheaper, have greater potential and higher capacity factors, and account for the majority of installed renewable generating capacity in the US and globally. Transmission is effective at integrating variable resources to smooth out natural variability. Connecting diverse resources over large regions slashes variability, which reduces the need for more expensive resources like storage and fast-start generation.

Seams are critical and focus at SPP will need to evolve beyond managing interfaces and transmission expansion with AECI, MISO and other neighbors in the Eastern Interconnection. Opportunities with ERCOT, WestConnect and Canadian provincial utilities need to be addressed given aging infrastructure near the seams and future upgrades and system reconfigurations that may make sense in terms of improving system economics and reliability.

Joint planning studies like the proposed 2016-2017 DOE-funded and NREL-led effort to access and optimize the existing Back-to-Back HVDC stations between the Eastern Interconnection and the Western Electricity Coordinating Council are timely and critically important in effective joint planning of the bulk power system in the heartland of North America. The flexibility and optionality provided by transmission capabilities between the eastern and western grids, particularly considering the opportunity to leverage new technologies and controls, needs to be considered to effectively address challenges like the EPA's Clean Power Plan.

CONCLUSIONS

Transmission enables and defines markets. Transmission, unlike other assets in the bulk power system, provides system flexibility and optionality which improves operating efficiencies. Transmission expansion also provides other benefits to grid operations and planning, though metrics are difficult to quantify.

The actual benefits for transmission assets, similar to market benefits, exceed planning model projections due to assumptions used in those simulations. Uncertainties and volatility in real world operations increase system costs and the value of transmission. Extreme market conditions and weather events demonstrate the tremendous value that enabling infrastructure like transmission provides.

The benefits quantified for these 2012-2014 transmission expansion projects, based on the first year of the SPP Integrated Marketplace, are significant and expected to grow in the near-term as large, high-capacity 345 kV projects from the Balanced Portfolio and Priority Projects were placed in service in the latter half of these simulations. The net present value savings and benefit-to-cost ratio for these 2012-2014 projects in SPP, based on operational analyses for the period March 1, 2014 through February 2015, are large, despite the fact that the benefits of those large, backbone EHV network upgrades were not fully captured.

Major transmission expansion is versatile and facilitates efficient resource planning and economic transfers that are very difficult, if not impossible, to forecast in advance. Transmission expansion is key to maximizing value and maintaining system flexibility when one must plan and address uncertainties.

BRATTLE GROUP LETTER

"THE SPP VALUE OF TRANSMISSION STUDY IS A PATH-BREAKING EFFORT. IT PROVIDES A MORE ACCURATE ESTIMATE OF THE TOTAL BENEFITS THAT A MORE ROBUST AND FLEXIBLE TRANSMISSION INFRASTRUCTURE PROVIDES TO POWER MARKETS, MARKET PARTICIPANTS AND, ULTIMATELY, RETAIL ELECTRIC CUSTOMERS."

- JOHANNES PFEIFENBERGER, JUDY CHANG AND ONUR AYDIN

The Brattle Group performed an independent assessment of this SPP study and provided the letter enclosed on the following pages. Brattle noted that the SPP study provided a more accurate estimate of the total benefits that a more robust and flexible transmission network delivers. In addition to recommendations regarding future study refinements, Brattle concludes that estimate present value of the production cost savings are likely to be understated.

THE Brattle GROUP

December 30, 2015

Mr. Jay Caspary
Director, R&D and Special Studies
Southwest Power Pool
201 Worthen Drive
Little Rock AR 72223-4936

Re: SPP Value of Transmission Study

Dear Jay:

Thank you for giving us the opportunity to review the "Value of Transmission" report and the associated PowerPoint summary presentation prepared by SPP staff in December 2015. The SPP study attempts to quantify the overall value provided by SPP transmission projects placed in service during 2012-2014. Based on our review of the final drafts of your study and several prior rounds of discussions in response to earlier drafts, we are pleased to provide the following comments:

- The SPP Value of Transmission study is a path-breaking effort. It provides a more accurate estimate of the total benefits that a more robust and flexible transmission infrastructure provides to power markets, market participants and, ultimately, retail electric customers.
- Relying on a full "re-run" of SPP's day-ahead and real-time markets without the evaluated transmission projects for 40 representative days during the first year of operation of SPP's Integrated Marketplace and comparing the re-run results to actual market results (which include the evaluated transmission projects after they were placed in service) yields a more complete and more accurate estimate of the production cost savings provided by the evaluated projects than the savings estimated in traditional planning studies.
- The estimated present value of the production cost savings in the SPP study likely is understated because: (a) many of major transmission projects evaluated were not yet in service during most of the 40 days that were analyzed; (b) the selected representative days did not include a full spectrum challenging system conditions (such as extreme weather or generation/transmission outage events) that must be expected to occur over the long service life of the evaluated transmission projects; and (c) based on the experience from other SPP transmission benefit studies, the growth rate of the quantified production cost savings may exceed the assumed annual rate of 10% per year.
- The methodologies applied by SPP staff to quantify the range of other transmission-related benefits are consistent with the methodologies applied in the ITP and RCAR evaluation process. Where deviations from the ITP and RCAR processes exist (e.g., in the estimation of public policy benefits), the methodologies applied are reasonable and represent best available industry practice.

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For future Value of Transmission studies, we also offer the following recommendations for further consideration:

- Reassess the selection of the typical days used to approximate each season of a study period. For example, in addition to highest and lowest production cost days, more reliable annual estimates might be obtained if (a subset of) the selected days also included a few average production cost days, or represented a combination of highest/lowest/average load days, highest/lowest/average market-price days, or highest/lowest/average congestion-cost days. Additional research would be necessary to establish which combination of typical days would most accurately capture the value of transmission for an entire study period.
- Select a study period which starts after all of the evaluated projects have been placed in service to ensure that the production cost analysis captures the benefit of the entire portfolio in each of the representative days simulated.
- Analyze the actual annual rates at which the production cost savings estimated for the study period are growing over time.
- Refine the methodologies used to estimate public policy benefits and wheeling revenue offsets to more accurately capture the benefits specifically attributable to the portfolio of transmission projects evaluated.
- Quantify the transmission-related benefits that are qualitatively discussed in the report as data and methodologies to estimate the value of those benefits become available. Some of the benefits discussed but not quantified are likely to provide significant additional value. Examples are "insurance" benefits that: (a) reduce the risks of high-cost outcomes during challenging system conditions (such as extreme weather or generation/transmission outage events), or (b) facilitate lower-cost options to address challenging future market conditions (such as those encountered under uncertain but plausible future environmental compliance scenarios).

We appreciate the opportunity to provide these comments on the Value of Transmission study, which we believe is a path-breaking effort that provides a more accurate estimate of the benefits that a more robust and flexible transmission infrastructure provides to power markets, its participants, and retail electric customers.

Sincerely,

Johannes Pfeifenberger
Principal

Judy Chang
Principal

Onur Aydin
Senior Associate

APPENDIX A: ACRONYMS

ACRONYM	DESCRIPTION
APC	Adjusted production cost
ATRR	Annual Transmission Revenue Requirement
CAIDI	Customer average interruption duration index. CAIDI is a measure of duration that provides the average amount of time a customer is without power per interruption.
CMTF	Capacity Margin Task Force
CONE	Cost of new entry
CPP	Clean Power Plan
CROW	Control Room Operations Window software
CT	Current transformer
EEI	Edison Electric Institute
EHV	Extra high voltage
FERC	Federal Energy Regulatory Commission
HPILS	High Priority Incremental Loads Study
ITP	Integrated Transmission Plan
ITP10	ITP 10-Year Assessment
ITP20	ITP 20-Year Assessment
MISO	Midcontinent Independent System Operator
MVP	Multi-value project
NYISO	New York Independent System Operator
PTC	Production Tax Credit
REC	Renewable Energy Credit
RPS	Renewable Portfolio Standards
RTO	Regional Transmission Organization
SAIDI	System average interruption duration index. SAIDI is a measure of duration. It measures the number of minutes over the year that the average customer is without power.
SCEC	South Central Electric Companies
SONGS	SDG&E's Steam Generator Replacement Project
SDG&E	San Diego Gas & Electric
SPP	Southwest Power Pool
TVA	Tennessee Valley Authority

APPENDIX B:

Projected NPV of SPP Transmission Projects Installed in 2012-14, Based on the First Year of SPP's Integrated Marketplace (Mar 2014 - Feb 2015)

BENEFIT CATEGORY	TRANSMISSION BENEFIT	NPV ($M)
Adjusted Production Cost Savings	Reduced production costs due to lower unit commitment, economic dispatch, and economically efficient transactions with neighboring systems	10,442*
1. Additional Production Cost Savings **	a. Impact of generation outages and A/S unit designations	INCLUDED
	b. Reduced transmission energy losses	INCLUDED
	c. Reduced congestion due to transmission outages	INCLUDED
	d. Mitigation of extreme events and system contingencies	PARTIAL
	e. Mitigation of weather and load uncertainty	PARTIAL
	f. Reduced cost due to imperfect foresight of real-time system conditions	INCLUDED
	g. Reduced cost of cycling power plants	PARTIAL
	h. Reduced amounts and costs of operating reserves and other ancillary services	PARTIAL
	i. Mitigation of reliability-must-run (RMR) conditions	N/Q
	j. More realistic "Day 1" market representation	N/Q
2. Reliability and Resource Adequacy Benefits	a. Avoided/deferred reliability projects	105
	b. Reduced loss of load probability or c. reduced planning reserve margin (2% assumed)	1,354
	d. Mandated reliability projects	2,166
3. Generation Capacity Cost Savings	a. Capacity cost benefits from reduced peak energy losses	171
	b. Deferred generation capacity investments	N/Q
	c. Access to lower-cost generation resources	PARTIAL
4. Market Benefits	a. increased competition	N/Q
	b. Increased market liquidity	N/Q
5. Other Benefits	a. storm hardening	N/Q
	b. fuel diversity	N/Q
	c. flexibility	N/Q
	d. reducing the costs of future transmission needs	N/Q
	e. wheeling revenues	1,133
	f. HVDC operational benefits	N/A
6. Environmental Benefits	a. Reduced emissions of air pollutants	N/Q
	b. Improved utilization of transmission corridors	N/Q
7. Public Policy Benefits	a. Optimal wind development	1,283
8. Employment and Economic Development Benefits	b. Other benefits of meeting public policy goals	N/Q
	Increased employment and economic activity; Increased tax revenues	N/Q
	TOTAL	**16,670 +**

** Benefits limited to SPP footprint since transactions with neighbors fixed*

***Partially captured since APC savings based on 40 days and did not include weather events like polar vortex, increased capital investments for rebuilds to address wear and tear impacts beyond in variable O&M, etc.*

APPENDIX C: INCLUDED TRANSMISSION PROJECTS

UPGRADE ID	PROJECT NAME	REL/ ECO	TYPE	IN-SERVICE DATE	BEST COST	1-YEAR COST	PRORATED COST 2014	3/1/14 - 2/28/15	PRORATED COST 2015	INFLATED COST	40-YEAR NPV
10927	Line - Sooner – Cleveland 345 kV (GRDA)	E	Balanced Portfolio	1/31/13	$3,718,139	$1,020,328	$1,020,328	$1,020,328	$1,020,328	$3,627,453	$9,012,312
10929	Line - Sooner - Cleveland 345 kV (OGE)	E	Balanced Portfolio	12/31/12	$46,000,000	$5,845,866	$5,845,866	$5,845,866	$5,845,866	$43,783,462	$49,768,061
10930	Line - Seminole - Muskogee 345 kV	E	Balanced Portfolio	12/31/13	$165,000,000	$21,493,088	$21,493,088	$21,493,088	$21,493,088	$160,975,610	$189,843,221
10932	Multi - Tuco - Woodward 345 kV (OGE)	E	Balanced Portfolio	5/19/14	$115,000,000	$15,354,532	$9,533,308	$12,022,092	$15,354,532	$115,000,000	$140,547,378
10933	Multi - Tuco - Woodward 345 kV (OGE)	E	Balanced Portfolio	5/19/14		$0	$0	$0	$0	$0	$0
10934	Tap - Swissvale - Stilwell	E	Balanced Portfolio	1/31/13	$2,866,604	$546,695	$546,695	$546,695	$546,695	$2,796,687	$4,828,821
10936	Multi - Tuco - Woodward 345 kV (SPS)	E	Balanced Portfolio	9/30/14	$192,875,814	$24,652,394	$6,230,825	$10,226,680	$24,652,394	$192,875,814	$225,655,156
10937	Multi - Tuco - Woodward 345 kV (OGE)	E	Balanced Portfolio	5/19/14		$0	$0	$0	$0	$0	$0
10938	Tap Anadarko - Washita 138 kV line into Gracemont 345 kV	E	Balanced Portfolio	10/12/12	$1,136,240	$197,264	$197,264	$197,264	$197,264	$1,081,489	$1,679,380
10940	Multi - Axtell - Post Rock - Spearville 345 kV	E	Balanced Portfolio	6/18/12	$79,171,915	$17,613,648	$17,613,648	$17,613,648	$17,613,648	$75,356,968	$149,951,630
10941	Multi - Axtell - Post Rock - Spearville 345 kV	E	Balanced Portfolio	6/18/12	$6,138,472	$1,365,647	$1,365,647	$1,365,647	$1,365,647	$5,842,686	$11,626,268
10942	Line - Axtell - Kansas Border 345 kV (NPPD)	E	Balanced Portfolio	12/10/12	$55,559,673	$6,171,746	$6,171,746	$6,171,746	$6,171,746	$52,882,497	$52,542,399
10943	Multi - Axtell - Post Rock - Spearville 345 kV	E	Balanced Portfolio	12/15/2012	$62,906,085	$13,994,933	$13,994,933	$13,994,933	$13,994,933	$59,874,917	$119,144,143
11085	Multi - Tuco - Woodward 345 kV (SPS)	E	Balanced Portfolio	6/2/2014	$12,550,762	$1,604,174	$934,299	$1,194,316	$1,604,174	$12,550,762	$14,683,770
10296	Line - Turk - SE Texarkana - 138 kV	X	Generation Interconnection	3/12/2012	$26,565,750	$3,363,691	$3,363,691	$3,363,691	$3,363,691	$25,285,663	$28,636,374
50459	SUB - PAWNEE 138 KV	X	Generation Interconnection	10/3/2014	$2,500,000	$703,199	$171,936	$285,916	$703,199	$2,500,000	$6,436,716

UPGRADE ID	PROJECT NAME	REL/ ECO	TYPE	IN-SERVICE DATE	BEST COST	1-YEAR COST	PRORATED COST 2014	3/1/14 - 2/28/15	PRORATED COST 2015	INFLATED COST	40-YEAR NPV
50460	LINE - FAIRFAX - PAWNEE 138 KV	X	Generation Intercon-nection	10/14/2014	$11,900,000	$3,347,227	$717,263	$1,259,808	$3,347,227	$11,900,000	$30,638,769
50461	SUB - SHIDLER 138KV OG&E Osage Sub work	X	Generation Intercon-nection	4/30/2014	$399,000	$53,078	$35,726	$44,329	$53,078	$399,000	$485,848
50462	Line - Washita - Grace-mont 138 kv ckt 2	X	Generation Intercon-nection	10/12/2012	$4,740,546	$823,011	$823,011	$823,011	$823,011	$4,512,120	$7,006,600
50463	SUB - SLICK HILLS 138KV	X	Generation Intercon-nection	2/1/2012	$1,500,000	$260,416	$260,416	$260,416	$260,416	$1,427,722	$2,217,023
50464	MULTI - RICE - CIRCLE 230KV CONVERSION	X	Generation Intercon-nection	11/7/2012	$10,225,261	$1,348,228	$1,348,228	$1,348,228	$1,348,228	$9,732,551	$11,477,971
50465	MULTI - RICE - CIRCLE 230KV CONVERSION	X	Generation Intercon-nection	11/29/2012	$5,373,496	$723,986	$723,986	$723,986	$723,986	$5,114,571	$6,163,568
50466	LINE - RICE COUNTY - LYONS 115KV	X	Generation Intercon-nection	4/1/2013	$3,245,758	$438,661	$438,661	$438,661	$438,661	$3,166,593	$3,874,584
50467	MULTI - RICE - CIRCLE 230KV CONVERSION	X	Generation Intercon-nection	10/1/2012	$2,473,404	$326,125	$326,125	$326,125	$326,125	$2,354,222	$2,776,424
50508	SUB - POI for GEN-2008-079 (Crooked Creek 115kV)	X	Generation Intercon-nection	10/2/2012	$665,522	$148,061	$148,061	$148,061	$148,061	$633,453	$1,260,499
50511	Sub - Wheatland 115 kV	X	Generation Intercon-nection	12/31/2012	$80,326	$10,591	$10,591	$10,591	$10,591	$76,455	$90,167
50562	Line(s) - Harrington - Nichols 230kV DBL CKT	X	Generation Intercon-nection	12/1/2012	$1,142,058	$138,938	$138,938	$138,938	$138,938	$1,087,027	$1,182,834
50614	Sub - POI for GEN-2012-001	X	Generation Intercon-nection	12/20/2012	$7,316,677	$890,118	$890,118	$890,118	$890,118	$6,964,119	$7,577,909
50617	Sub - Lopez 115kV	X	Generation Intercon-nection	2/8/2013	$151,581	$18,902	$18,902	$18,902	$18,902	$147,884	$166,955
50646	SUB - SHIDLER 138KV OG&E Osage Sub work	X	Generation Intercon-nection	7/1/2014	$399,300	$53,314	$26,803	$35,445	$53,314	$399,300	$488,005
50664	Sub - Spearville 345kV GEN-2005-012 Addi-tion	X	Generation Intercon-nection	6/1/2012	$2,903,000	$695,193	$695,193	$695,193	$695,193	$2,763,117	$5,918,443

UPGRADE ID	PROJECT NAME	REL/ ECO	TYPE	IN-SERVICE DATE	BEST COST	1-YEAR COST	PRORATED COST 2014	3/1/14 - 2/28/15	PRORATED COST 2015	INFLATED COST	40-YEAR NPV
50667	Sub - Sweetwater 230kV GEN-2006-035 Addition	X	Generation Interconnection	10/5/2012	$624,000	$79,009	$79,009	$79,009	$79,009	$593,932	$672,637
50670	Sub - Viola 345kV	X	Generation Interconnection	6/1/2012	$9,567,558	$1,289,064	$1,289,064	$1,289,064	$1,289,064	$9,106,539	$10,974,289
50671	Sub - Buckner 345kV	X	Generation Interconnection	4/10/2012	$5,395,772	$1,292,148	$1,292,148	$1,292,148	$1,292,148	$5,135,773	$11,000,540
50674	Sub - Hunter 345kV	X	Generation Interconnection	9/26/2012	$8,226,915	$1,045,510	$1,045,510	$1,045,510	$1,045,510	$7,830,496	$8,900,818
50676	Line(s) - Harrington - Nichols 230kV DBL CKT	X	Generation Interconnection	12/1/2012	$1,142,058	$138,938	$138,938	$138,938	$138,938	$1,087,027	$1,182,834
50677	Sub - Potter County 345kV GEN-2008-051 Addition	X	Generation Interconnection	5/1/2012	$3,005,283	$365,611	$365,611	$365,611	$365,611	$2,860,472	$3,112,582
50678	Sub - Deer Creek - Sinclair 69kV Ckt 1	X	Generation Interconnection	10/1/2012	$2,079,212	$264,235	$264,235	$264,235	$264,235	$1,979,024	$2,249,529
50679	Sub - Viola 345kV GEN-2010-005 Addition	X	Generation Interconnection	10/1/2012	$26,000	$3,503	$3,503	$3,503	$3,503	$24,747	$29,823
50681	Sub - Buckner 345kV GEN-2010-009 Addition	X	Generation Interconnection	9/15/2012	$570,131	$136,532	$136,532	$136,532	$136,532	$542,659	$1,162,345
50682	Sub - Cimarron 345kV GEN-2010-040 Addition	X	Generation Interconnection	12/31/2012	$4,516,234	$573,941	$573,941	$573,941	$573,941	$4,298,617	$4,886,179
50683	Sub - Minco 345kV GEN-2011-010 Addition	X	Generation Interconnection	8/30/2012	$2,554,395	$324,623	$324,623	$324,623	$324,623	$2,431,310	$2,763,637
50684	Sub - Lopez 115kV	X	Generation Interconnection	2/15/2013	$3,371,204	$420,380	$420,380	$420,380	$420,380	$3,288,980	$3,713,118
50685	Sub - POI for GEN-2012-001	X	Generation Interconnection	12/20/2012	$7,086,677	$862,137	$862,137	$862,137	$862,137	$6,745,201	$7,339,697
50686	Sub - Petersburg North 115kV	X	Generation Interconnection	11/9/2012	$450,000	$49,987	$49,987	$49,987	$49,987	$428,316	$425,562
50687	Sub - Petersburg North 115kV	X	Generation Interconnection	11/9/2012	$450,000	$49,987	$49,987	$49,987	$49,987	$428,316	$425,562

UPGRADE ID	PROJECT NAME	REL/ ECO	TYPE	IN-SERVICE DATE	BEST COST	1-YEAR COST	PRORATED COST 2014	3/1/14 - 2/28/15	PRORATED COST 2015	INFLATED COST	40-YEAR NPV
50751	SUB - Finney 345kV GEN-2008-018 Addition	X	Generation Interconnection	11/2/2013	$2,252,249	$280,850	$280,850	$280,850	$280,850	$2,197,316	$2,480,677
51009	Sub - Steele City 115kV GEN-2011-018 Addition	X	Generation Interconnection	11/15/2013	$200,000	$22,772	$22,772	$22,772	$22,772	$195,122	$201,140
51010	Sub - Jones 230kV GEN-2011-045 Addition	X	Generation Interconnection	2/15/2013	$1,957,010	$244,034	$244,034	$244,034	$244,034	$1,909,278	$2,155,494
51011	Sub - Mustang 230kV GEN-2011-048 Addition	X	Generation Interconnection	11/26/2012	$878,667	$106,895	$106,895	$106,895	$106,895	$836,328	$910,039
51012	Sub - Rubart 115kV	X	Generation Interconnection	11/15/2013	$11,209,762	$2,751,559	$2,751,559	$2,751,559	$2,751,559	$10,936,353	$24,303,848
51023	Sub - Tatonga 345kV GEN-2007-021 Addition	X	Generation Interconnection	11/1/2014	$1,973,375	$263,480	$43,431	$86,138	$263,480	$1,973,375	$2,411,762
51024	Sub - Tatonga 345kV GEN-2007-044 Addition	X	Generation Interconnection	10/1/2014	$1,973,375	$263,480	$65,870	$108,577	$263,480	$1,973,375	$2,411,762
51038	Sub - Beaver County 345kV Substation	X	Generation Interconnection	9/29/2014	$15,744,936	$2,102,227	$537,107	$877,853	$2,102,227	$15,744,936	$19,242,691
51041	Sub - Madison County 230kV Substation	X	Generation Interconnection	12/23/2013	$1,450,000	$165,097	$165,097	$165,097	$165,097	$1,414,634	$1,458,265
51042	Sub - Madison County 230kV Substation	X	Generation Interconnection	12/23/2013	$1,450,000	$165,097	$165,097	$165,097	$165,097	$1,414,634	$1,458,265
51043	Sub - Madison County 230kV Substation	X	Generation Interconnection	12/23/2013	$5,900,000	$671,776	$671,776	$671,776	$671,776	$5,756,098	$5,933,630
11241	Multi - Hitchland - Woodward 345 kV (SPS)	E	High Priority	5/1/2014		$0	$0	$0	$0	$0	$0
11242	Multi - Hitchland - Woodward 345 kV (SPS)	E	High Priority	5/1/2014	$56,479,846	$7,218,963	$4,839,085	$6,009,192	$7,218,963	$56,479,846	$66,078,624
11243	Multi - Hitchland - Woodward 345 kV (SPS)	R	High Priority	5/1/2014	$4,723,219	$603,698	$404,676	$502,528	$603,698	$4,723,219	$5,525,932
11244	Line - Hitchland - Woodward 345 kV dbl Ckt (OGE)	E	High Priority	5/16/2014	$168,000,000	$22,430,969	$14,111,791	$17,747,580	$22,430,969	$168,000,000	$205,321,387

UPGRADE ID	PROJECT NAME	REL/ ECO	TYPE	IN-SERVICE DATE	BEST COST	1-YEAR COST	PRORATED COST 2014	3/1/14 - 2/28/15	PRORATED COST 2015	INFLATED COST	40-YEAR NPV
11245	Line - Hitchland - Woodward 345 kV dbl Ckt (OGE)	E	High Priority	5/16/2014		$0	$0	$0	$0	$0	$0
11246	Line - Thistle - Woodward 345 kV dbl Ckt (OGE)	E	High Priority	11/4/2014	$142,040,000	$18,964,850	$2,969,770	$6,043,743	$18,964,850	$142,040,000	$173,594,344
11247	Line - Thistle - Woodward 345 kV dbl Ckt (OGE)	E	High Priority	11/4/2014		$0	$0	$0	$0	$0	$0
11248	Line - Thistle - Woodward 345 kV dbl Ckt (PW)	E	High Priority	11/4/2014	$22,610,000	$5,284,774	$827,561	$1,684,159	$5,284,774	$22,610,000	$48,374,069
11249	Line - Thistle - Woodward 345 kV dbl Ckt (PW)	E	High Priority	11/4/2014	$22,610,000	$5,284,774	$827,561	$1,684,159	$5,284,774	$22,610,000	$48,374,069
11252	Multi - Spearville - Ironwood - Clark Co. - Thistle 345 kV Double Circuit	E	High Priority	12/17/2014	$50,565,144	$11,818,902	$454,573	$2,370,274	$11,818,902	$50,565,144	$108,184,067
11253	Multi - Spearville - Ironwood - Clark Co. - Thistle 345 kV Double Circuit	E	High Priority	12/17/2014	$50,565,144	$11,818,902	$454,573	$2,370,274	$11,818,902	$50,565,144	$108,184,067
11254	Multi - Spearville - Ironwood - Clark Co. - Thistle 345 kV Double Circuit	E	High Priority	12/17/2014	$91,618,023	$21,414,444	$823,632	$4,294,655	$21,414,444	$91,618,023	$196,016,654
11255	Multi - Spearville - Ironwood - Clark Co. - Thistle 345 kV Double Circuit	E	High Priority	12/17/2014	$91,618,023	$21,414,444	$823,632	$4,294,655	$21,414,444	$91,618,023	$196,016,654
11258	Line - Thistle - Wichita 345 kV dbl Ckt	E	High Priority	5/19/2014	$58,140,000	$13,589,420	$8,437,387	$10,640,068	$13,589,420	$58,140,000	$124,390,463
11259	Line - Thistle - Wichita 345 kV dbl Ckt	E	High Priority	5/19/2014	$58,140,000	$13,589,420	$8,437,387	$10,640,068	$13,589,420	$58,140,000	$124,390,463
11260	Multi - Spearville - Ironwood - Clark Co. - Thistle 345 kV Double Circuit	E	High Priority	12/17/2014	$6,284,694	$1,468,960	$56,498	$294,599	$1,468,960	$6,284,694	$13,446,096
11497	Line - Thistle - Wichita 345 kV dbl Ckt	E	High Priority	6/4/2014	$10,746,938	$1,521,269	$877,655	$1,124,234	$1,521,269	$10,746,938	$13,924,899
50384	Multi - Spearville - Ironwood - Clark Co. - Thistle 345 kV Double Circuit	E	High Priority	12/17/2014	$7,106,987	$1,661,160	$63,891	$333,145	$1,661,160	$7,106,987	$15,205,390

UPGRADE ID	PROJECT NAME	REL/ ECO	TYPE	IN-SERVICE DATE	BEST COST	1-YEAR COST	PRORATED COST 2014	3/1/14 - 2/28/15	PRORATED COST 2015	INFLATED COST	40-YEAR NPV
50705	Device - Spalding 115 kV Cap Bank	R	High Priority	1/1/2014	$538,071	$62,797	$62,797	$62,797	$62,797	$538,071	$574,807
50792	Multi - Spearville - Ironwood - Clark Co. - Thistle 345 kV Double Circuit	E	High Priority	12/17/2014	$1,850,000	$432,412	$16,631	$86,720	$432,412	$1,850,000	$3,958,073
50793	Multi - Spearville - Ironwood - Clark Co. - Thistle 345 kV Double Circuit	E	High Priority	12/17/2014	$9,191,986	$2,148,499	$82,635	$430,880	$2,148,499	$9,191,986	$19,666,243
50810	Line - Jenson - Jenson Tap 138 kV Ckt 1	R	High Priority	8/1/2014	$0	$0	$0	$0	$0	$0	$0
50824	Line - Garden City - Kansas Avenue 115 kV Ckt 1	R	High Priority	3/20/2014	$112,722	$26,347	$20,701	$24,972	$26,347	$112,722	$241,169
51013	Line - Darlington - Red Rock 138 kV Ckt 1	R	High Priority	10/4/2013	$15,277,233	$1,982,726	$1,982,726	$1,982,726	$1,982,726	$14,904,618	$17,512,934
51015	Line - Grady - Phillips Gas 138 kV Ckt 1 and 2	R	High Priority	12/31/2014	$8,318,584	$1,106,601	$0	$179,367	$1,106,601	$8,318,584	$10,129,252
51029	Multi - Spearville - Ironwood - Clark Co. - Thistle 345 kV Double Circuit	E	High Priority	12/17/2014	$200,000	$46,747	$1,798	$9,375	$46,747	$200,000	$427,900
51045	Line - Benteler - Port Robson 138 kV Ckt 1 and 2	R	High Priority	9/5/2014	$2,248,743	$299,145	$96,154	$144,641	$299,145	$2,248,743	$2,738,217
51046	Line - Benteler - Port Robson 138 kV Ckt 1 and 2	R	High Priority	12/11/2014	$2,548,575	$339,031	$18,628	$73,581	$339,031	$2,548,575	$3,103,312
51047	Sub - Ellis 138 kV	R	High Priority	6/1/2013	$4,100,000	$532,110	$532,110	$532,110	$532,110	$4,000,000	$4,700,002
51052	Sub - S1260 161 kV	R	High Priority	11/7/2014	$4,636,045	$489,595	$72,632	$151,990	$489,595	$4,636,045	$4,481,495
51053	Sub - S1398 161 kV	R	High Priority	6/28/2013	$2,824,664	$291,026	$291,026	$291,026	$291,026	$2,755,770	$2,570,563
51055	Sub - Tallgrass 138 kV	R	High Priority	3/1/2014	$4,100,000	$580,370	$486,299	$580,370	$580,370	$4,100,000	$5,312,405
10140	Multi - Wallace Lake - Port Robson - RedPoint 138 kV	R	Regional Reliability	4/16/2012	$9,480,000	$1,200,335	$1,200,335	$1,200,335	$1,200,335	$9,023,200	$10,218,903
10141	Multi - Wallace Lake - Port Robson - RedPoint 138 kV	R	Regional Reliability	3/1/2012	$19,482,000	$2,466,764	$2,466,764	$2,466,764	$2,466,764	$18,543,248	$21,000,493

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10173	Multi - Lindsay - Lindsay SW and Bradley-Rush Springs	R	Regional Reliability	12/5/2012	$2,769,825	$480,872	$480,872	$480,872	$480,872	$2,636,360	$4,093,845
10179	Line - ACME - W Norman 69 kV	R	Regional Reliability	12/1/2014	$912,000	$166,349	$13,710	$40,673	$166,349	$912,000	$1,522,670
10195	XFR - Tuco 115/69 kV Transformer Ckt 3	R	Regional Reliability	5/16/2014	$3,212,132	$410,558	$258,291	$324,837	$410,558	$3,212,132	$3,758,035
10215	Line - Holcomb - Plymell 115 kV	R	Regional Reliability	6/1/2012	$3,986,076	$954,562	$954,562	$954,562	$954,562	$3,794,005	$8,126,546
10221	Line - Tecumseh Energy Center - Midland 115 kV	R	Regional Reliability	7/19/2013	$5,498,564	$759,358	$759,358	$759,358	$759,358	$5,364,453	$6,707,224
10231	Line - Chase - White Junction 69 kV	R	Regional Reliability	5/29/2013	$4,520,009	$624,218	$624,218	$624,218	$624,218	$4,409,765	$5,513,569
10300	Line - Fort Smith - Colony 161 kV 2	R	Regional Reliability	6/15/2014	$2,120,000	$283,057	$154,748	$200,629	$283,057	$2,120,000	$2,590,960
10303	Line - Atoka - WFEC Tupelo - Lane 138 kV	R	Regional Reliability	6/1/2013	$6,784,050	$1,207,230	$1,207,230	$1,207,230	$1,207,230	$6,618,585	$10,663,168
10305	Line - WFEC Snyder - AEP Snyder	R	Regional Reliability	3/1/2012	$1,273,772	$221,141	$221,141	$221,141	$221,141	$1,212,395	$1,882,655
10309	Multi - OU SW - Goldsby - Canadian SW 138 kV	R	Regional Reliability	10/25/2013	$369,740	$65,796	$65,796	$65,796	$65,796	$360,722	$581,157
10310	Multi - OU SW - Goldsby - Canadian SW 138 kV	R	Regional Reliability	10/15/2013	$369,740	$65,796	$65,796	$65,796	$65,796	$360,722	$581,157
10311	Multi - OU SW - Goldsby - Canadian SW 138 kV	R	Regional Reliability	10/31/2013	$3,469,399	$617,384	$617,384	$617,384	$617,384	$3,384,780	$5,453,201
10326	Multi - Hitchland - Texas Co. 230 kV and 115 kV	R	Regional Reliability	6/8/2012	$36,991,437	$4,500,231	$4,500,231	$4,500,231	$4,500,231	$35,208,982	$38,312,164
10330	Multi - Hitchland - Texas Co. 230 kV and 115 kV	R	Regional Reliability	4/9/2013	$20,137,782	$2,511,129	$2,511,129	$2,511,129	$2,511,129	$19,646,617	$22,180,195
10331	Multi - Hitchland - Texas Co. 230 kV and 115 kV	R	Regional Reliability	4/9/2013	$8,121,300	$1,012,705	$1,012,705	$1,012,705	$1,012,705	$7,923,220	$8,944,978
10351	Line - Halstead - Mud Creek Jct. - 69 kV	R	Regional Reliability	2/24/2012	$703,186	$94,742	$94,742	$94,742	$94,742	$669,303	$806,576
10352	Line - Halstead - Mud Creek Jct. - 69 kV	R	Regional Reliability	5/23/2012	$4,313,368	$581,152	$581,152	$581,152	$581,152	$4,105,526	$4,947,568
10385	Multi - Kansas Tap - Siloam City 161KV	R	Regional Reliability	11/15/2013	$4,780,359	$1,311,822	$1,311,822	$1,311,822	$1,311,822	$4,663,765	$11,587,003

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10386	Multi - Kansas Tap - Siloam City 161KV	R	Regional Reliability	11/15/2013	$2,002,021	$549,393	$549,393	$549,393	$549,393	$1,953,191	$4,852,653
10388	XFR - Sallisaw 161/69 kV Auto #2	R	Regional Reliability	7/15/2012	$2,115,237	$566,304	$566,304	$566,304	$566,304	$2,013,313	$4,821,158
10415	Multi - Cowskin - Westlink - Tyler - Hoover 69 kV	R	Regional Reliability	5/9/2014	$4,737,867	$670,662	$434,825	$543,531	$670,662	$4,737,867	$6,138,895
10417	Line - Oaklawn - Oliver 69 kV	R	Regional Reliability	7/25/2012	$2,709,837	$365,104	$365,104	$365,104	$365,104	$2,579,262	$3,108,268
10480	Line - Plymell - Pioneer Tap 115 kV	R	Regional Reliability	6/1/2012	$5,534,364	$1,325,337	$1,325,337	$1,325,337	$1,325,337	$5,267,687	$11,283,092
10505	Line - Riverside - Okmulgee 138 kV	R	Regional Reliability	3/1/2012	$125,000	$15,827	$15,827	$15,827	$15,827	$118,977	$134,743
10509	Line - Lone Star South - Pittsburg 138kV Ckt 1	R	Regional Reliability	5/11/2012	$300,000	$37,985	$37,985	$37,985	$37,985	$285,544	$323,383
10510	Line - Howell - Kilgore 69 kV	R	Regional Reliability	5/7/2012	$3,986,000	$504,698	$504,698	$504,698	$504,698	$3,793,932	$4,296,682
10520	Line - Pharoah - Weleetka 138 kV	R	Regional Reliability	9/28/2012	$0	$0	$0	$0	$0	$0	$0
10521	Line - WFEC Russell - AEP Altus Jct Tap 138 kV	R	Regional Reliability	6/1/2012	$50,000	$8,681	$8,681	$8,681	$8,681	$47,591	$73,901
10575	Line - Osborne - Osborne Tap	R	Regional Reliability	11/12/2013	$2,000,000	$259,566	$259,566	$259,566	$259,566	$1,951,220	$2,292,684
10582	Multi - Flint Creek – Centerton 345 kV and Centerton- East Centerton 161 kV	R	Regional Reliability	4/28/2014	$11,962,000	$1,591,276	$1,079,795	$1,337,721	$1,591,276	$11,962,000	$14,565,713
10584	Multi - Flint Creek – Centerton 345 kV and Centerton- East Centerton 161 kV	R	Regional Reliability	4/28/2014	$13,104,000	$1,743,194	$1,182,882	$1,465,432	$1,743,194	$13,104,000	$15,956,287
10585	Multi - Flint Creek – Centerton 345 kV and Centerton- East Centerton 161 kV	R	Regional Reliability	4/28/2014	$34,085,000	$4,534,246	$3,076,810	$3,811,756	$4,534,246	$34,085,000	$41,504,125
10603	Line - Gill - Interstate 138 kV	R	Regional Reliability	12/4/2013	$67,008	$9,254	$9,254	$9,254	$9,254	$65,374	$81,737
10647	Line - Northwest Henderson - Poynter 69 kV	R	Regional Reliability	6/6/2014	$7,815,833	$1,039,722	$594,127	$762,653	$1,039,722	$7,815,833	$9,517,069
10648	Line - Diana - Perdue 138 kV	R	Regional Reliability	12/31/2014	$1,004,187	$133,585	$0	$21,652	$133,585	$1,004,187	$1,222,763
10668	Line - Rose Hill - Sooner 345 kV (OGE)	R	Regional Reliability	6/1/2012	$45,935,000	$5,837,605	$5,837,605	$5,837,605	$5,837,605	$43,721,594	$49,697,737

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10674	Line - Rose Hill - Sooner 345 kV Ckt 1 (WR)	R	Regional Reliability	4/27/2012	$84,379,298	$11,368,661	$11,368,661	$11,368,661	$11,368,661	$80,313,431	$96,785,701
10698	Line - Maid - Pryor Foundry South 69 kV	R	Regional Reliability	1/15/2014	$1,993,805	$560,817	$539,247	$560,817	$560,817	$1,993,805	$5,133,423
10699	Line - Maid - Redden 69 kV	R	Regional Reliability	5/1/2014	$2,104,778	$592,031	$396,856	$492,817	$592,031	$2,104,778	$5,419,144
10701	Multi - Johnson - Massard 161 kV	R	Regional Reliability	3/29/2013	$9,684,152	$1,261,469	$1,261,469	$1,261,469	$1,261,469	$9,447,953	$11,142,246
10705	Multi: Dallam - Channing - Tascosa -Potter	R	Regional Reliability	5/29/2012	$9,590,276	$1,166,715	$1,166,715	$1,166,715	$1,166,715	$9,128,163	$9,932,683
10713	Multi - Litchfield - Aquarius - Hudson Jct. 69 kV Uprate	R	Regional Reliability	6/1/2013	$181,444	$25,058	$25,058	$25,058	$25,058	$177,019	$221,328
10757	Line - Ocotillo sub conversion 115 kV	R	Regional Reliability	3/23/2012	$3,102,202	$377,402	$377,402	$377,402	$377,402	$2,952,721	$3,212,962
10792	Multi: Dover-Twin Lake-Crescent-Cottonwood conversion 138 kV	R	Regional Reliability	10/30/2014	$8,100,000	$1,081,493	$184,210	$359,507	$1,081,493	$8,100,000	$9,899,424
10794	Multi: WFEC-Dover-Twin Lake_Cresent-Cottonwood conversion 138 kV	R	Regional Reliability	12/11/2013	$5,765,600	$1,025,996	$1,025,996	$1,025,996	$1,025,996	$5,624,976	$9,062,369
10795	Multi: WFEC-Dover-Twin Lake_Cresent-Cottonwood conversion 138 kV	R	Regional Reliability	12/9/2013	$5,315,700	$945,935	$945,935	$945,935	$945,935	$5,186,049	$8,355,216
10796	Multi: WFEC-Dover-Twin Lake_Cresent-Cottonwood conversion 138 kV	R	Regional Reliability	10/31/2013	$3,164,000	$563,038	$563,038	$563,038	$563,038	$3,086,829	$4,973,175
10797	Multi: WFEC-Dover-Twin Lake_Cresent-Cottonwood conversion 138 kV	R	Regional Reliability	10/31/2013	$3,937,500	$700,683	$700,683	$700,683	$700,683	$3,841,463	$6,188,962
10799	Multi - Lindsay - Lindsay SW and Bradley-Rush Springs	R	Regional Reliability	11/20/2012	$1,248,750	$216,797	$216,797	$216,797	$216,797	$1,188,578	$1,845,672
10806	Multi - NW Manhattan	R	Regional Reliability	5/11/2012	$4,249,559	$572,555	$572,555	$572,555	$572,555	$4,044,791	$4,874,377
10808	Multi - NW Manhattan	R	Regional Reliability	3/19/2012	$18,624,222	$2,509,294	$2,509,294	$2,509,294	$2,509,294	$17,726,803	$21,362,567
10812	Line - Fort Junction - West Junction City 115 kV	R	Regional Reliability	5/21/2013	$5,569,785	$769,194	$769,194	$769,194	$769,194	$5,433,937	$6,794,101

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10829	Line - Chaves Co - Roswell Int 69/115 kV Voltage Conversion	R	Regional Reliability	1/31/2014	$8,610,000	$1,100,486	$1,009,787	$1,100,486	$1,100,486	$8,610,000	$10,073,274
10830	Multi - Loma Vista - Montrose 161 kV - Tap into K.C. South	R	Regional Reliability	1/14/2013	$6,238,437	$788,087	$788,087	$788,087	$788,087	$6,086,280	$6,960,977
10837	Multi - Johnson - Massard 161 kV	R	Regional Reliability	3/29/2013		$0	$0	$0	$0	$0	$0
10839	Line - Sub 170 Nichols - Sub 80 Sedalia 69 kV	R	Regional Reliability	5/1/2012	$5,352,187	$814,930	$814,930	$814,930	$814,930	$5,094,289	$6,937,808
10843	Line - Kilgore - VBI 69 kV	R	Regional Reliability	11/23/2013	$33,267	$4,333	$4,333	$4,333	$4,333	$32,456	$38,276
10847	XFR - Clinton 161/69 kV	R	Regional Reliability	4/2/2014	$1,972,428	$255,401	$191,551	$232,949	$255,401	$1,972,428	$2,337,811
10853	Line - Lone Star-Locust Grove 115 kV	R	Regional Reliability	2/13/2014	$2,150,000	$286,009	$252,223	$286,009	$286,009	$2,150,000	$2,617,981
10854	Multi - South Harper 161 kV cut-in to Stilwell-Archie Junction 161 kV line	R	Regional Reliability	1/25/2013	$4,672,809	$590,305	$590,305	$590,305	$590,305	$4,558,838	$5,214,017
10858	Line - Pratt - St. John 115 kV rebuild	R	Regional Reliability	6/15/2014	$15,079,303	$3,524,578	$1,926,899	$2,498,190	$3,524,578	$15,079,303	$32,262,151
10865	Line - Reeding - Twin Lakes Switchyard conversion to 138 kV	R	Regional Reliability	10/31/2013	$1,971,000	$350,742	$350,742	$350,742	$350,742	$1,922,927	$3,098,017
10870	Line - GEC West - Waco 138 kV	R	Regional Reliability	10/30/2012	$4,857,641	$654,484	$654,484	$654,484	$654,484	$4,623,573	$5,571,867
10875	Line - Pecan Creek - Five Tribes 161 kV Ckt 1	R	Regional Reliability	2/1/2014	$3,022,363	$403,539	$369,172	$403,539	$403,539	$3,022,363	$3,693,784
10878	Line - El Reno - El Reno SW 69 kV	R	Regional Reliability	6/1/2012	$1,950,000	$338,541	$338,541	$338,541	$338,541	$1,856,038	$2,882,130
10879	Line - Bradley - Lindsay 69 kV Ckt 1 reconductor	R	Regional Reliability	9/11/2012	$3,712,500	$644,531	$644,531	$644,531	$644,531	$3,533,611	$5,487,132
10898	Line - Broadmoor - Fern Street 69 kV	R	Regional Reliability	12/31/2014	$4,923,124	$654,911	$0	$106,153	$654,911	$4,923,124	$5,994,718
10952	Line - Glenare - Liberty 69 kV Ckt 1	R	Regional Reliability	3/31/2014	$1,950,000	$252,497	$190,760	$231,687	$252,497	$1,950,000	$2,311,228
10953	Line - Blue Spring South - Prairie Lee 161 kV Ckt 1	R	Regional Reliability	6/20/2013	$24,933	$3,150	$3,150	$3,150	$3,150	$24,325	$27,821
10986	Line - Maloney - North Platte 115 kV	R	Regional Reliability	6/1/2012	$1,451,500	$161,237	$161,237	$161,237	$161,237	$1,381,559	$1,372,674

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10993	Line - Harper - Milan Tap 138 kV	R	Regional Reliability	8/1/2013	$19,662	$4,484	$4,484	$4,484	$4,484	$19,182	$39,603
11011	Multi - Canadian River - McAlester City - Dustin 138 kV	R	Regional Reliability	6/28/2013	$24,965,000	$3,240,034	$3,240,034	$3,240,034	$3,240,034	$24,356,098	$28,618,428
11012	Multi - Canadian River - McAlester City - Dustin 138 kV	R	Regional Reliability	6/28/2013	$9,513,000	$1,234,626	$1,234,626	$1,234,626	$1,234,626	$9,280,976	$10,905,151
11015	Line - Ashdown - Craig Junction 138 kV Rebuild	R	Regional Reliability	2/8/2013	$2,500,000	$324,458	$324,458	$324,458	$324,458	$2,439,024	$2,865,855
11019	Multi - Cherry Sub add 230kV source and 115 kV Hastings Conversion	R	Regional Reliability	3/21/2014	$3,792,408	$484,726	$379,525	$458,093	$484,726	$3,792,408	$4,436,930
11020	Multi - Cherry Sub add 230kV source and 115 kV Hastings Conversion	R	Regional Reliability	3/21/2014	$9,736,187	$1,244,429	$974,347	$1,176,054	$1,244,429	$9,736,187	$11,390,857
11021	Multi - Cherry Sub add 230kV source and 115 kV Hastings Conversion	R	Regional Reliability	5/1/2014	$1,048,295	$133,988	$89,816	$111,534	$133,988	$1,048,295	$1,226,453
11029	Line - Maddox - Sanger SW 115 kV	R	Regional Reliability	5/4/2012	$1,912,542	$232,672	$232,672	$232,672	$232,672	$1,820,385	$1,980,827
11033	XFR - Install 2nd Randall 230/115 kV transformer	R	Regional Reliability	5/13/2013	$7,997,141	$997,223	$997,223	$997,223	$997,223	$7,802,089	$8,808,227
11036	Line - Maddox Station - Monument 115 kV Ckt 1	R	Regional Reliability	11/30/2012	$1,689,108	$205,490	$205,490	$205,490	$205,490	$1,607,717	$1,749,415
11038	Line - Brasher Tap - Roswell Interchange 115 kV	R	Regional Reliability	10/25/2013	$75,000	$9,352	$9,352	$9,352	$9,352	$73,171	$82,607
11040	Multi - New Hart Interchange 230/115 kV	R	Regional Reliability	1/31/2014	$12,864,507	$1,644,275	$1,508,758	$1,644,275	$1,644,275	$12,864,507	$15,050,836
11041	Multi - New Hart Interchange 230/115 kV	R	Regional Reliability	12/19/2014	$19,959,385	$2,551,106	$84,102	$497,606	$2,551,106	$19,959,385	$23,351,493
11042	Multi - New Hart Interchange 230/115 kV	R	Regional Reliability	3/25/2014	$16,108,465	$2,058,901	$1,589,426	$1,923,149	$2,058,901	$16,108,465	$18,846,107
11043	Multi - New Hart Interchange 230/115 kV	R	Regional Reliability	1/31/2014	$15,491,109	$1,979,994	$1,816,808	$1,979,994	$1,979,994	$15,491,109	$18,123,831
11044	Multi - New Hart Interchange 230/115 kV	R	Regional Reliability	1/31/2014	$2,568,905	$328,344	$301,283	$328,344	$328,344	$2,568,905	$3,005,492
11045	Multi - New Hart Interchange 230/115 kV	R	Regional Reliability	12/19/2014	$17,384,254	$2,221,966	$73,252	$433,405	$2,221,966	$17,384,254	$20,338,717

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11046	Line - Cunningham - Buckey Tap 115 kV reconductor	R	Regional Reliability	6/27/2013	$3,516,246	$438,467	$438,467	$438,467	$438,467	$3,430,484	$3,872,871
11052	Multi - Pleasant Hill-Potter 230 kV Ckt 1	R	Regional Reliability	12/31/2014	$15,713,303	$2,008,394	$0	$325,536	$2,008,394	$15,713,303	$18,383,787
11053	Multi - Pleasant Hill-Potter 230 kV Ckt 1	R	Regional Reliability	12/31/2014	$13,694,777	$1,750,396	$0	$283,718	$1,750,396	$13,694,777	$16,022,211
11054	Multi - Pleasant Hill-Potter 230 kV Ckt 1	R	Regional Reliability	12/31/2014	$15,180,231	$1,940,259	$0	$314,493	$1,940,259	$15,180,231	$17,760,119
11078	Line - Albion - Genoa 115 kV	R	Regional Reliability	6/1/2014	$773,349	$90,255	$52,814	$67,443	$90,255	$773,349	$826,148
11079	Line - Albion - Spalding 115 kV	R	Regional Reliability	6/1/2013	$1,214,028	$138,230	$138,230	$138,230	$138,230	$1,184,418	$1,220,948
11080	Line - Loup City - North Loup 115 kV	R	Regional Reliability	6/1/2012	$1,818,986	$202,059	$202,059	$202,059	$202,059	$1,731,337	$1,720,202
11096	XFR - Kingsmill 115/69 kV Ckt 2	R	Regional Reliability	6/28/2013	$4,400,000	$548,669	$548,669	$548,669	$548,669	$4,292,683	$4,846,257
11100	XFR - Northeast Hereford 115/69 kV Transformer Ckt 2	R	Regional Reliability	8/29/2013	$4,200,902	$523,842	$523,842	$523,842	$523,842	$4,098,441	$4,626,966
11102	Multi - Move Load from East Clovis 69 kV to East Clovis 115 kV	R	Regional Reliability	6/30/2013	$2,125,000	$264,982	$264,982	$264,982	$264,982	$2,073,171	$2,340,522
11107	Multi - Kress Inter-change - Kiser - Cox 115 kV	R	Regional Reliability	11/21/2014	$13,584,121	$1,736,252	$190,797	$472,223	$1,736,252	$13,584,121	$15,892,749
11109	Multi - Kress Inter-change - Kiser - Cox 115 kV	R	Regional Reliability	3/7/2014	$6,850,000	$875,532	$719,187	$861,100	$875,532	$6,850,000	$8,014,161
11117	Line - Wakita - Nash 69 kV Ckt 1	R	Regional Reliability	12/15/2013	$6,705,000	$1,193,163	$1,193,163	$1,193,163	$1,193,163	$6,541,463	$10,538,918
11121	Line - Harrington - Randall County 230 kV	R	Regional Reliability	5/13/2013	$159,060	$19,834	$19,834	$19,834	$19,834	$155,180	$175,192
11129	Multi - Cushing Area 138 kV	R	Regional Reliability	6/1/2014		$0	$0	$0	$0	$0	$0
11130	Multi - Cushing Area 138 kV	R	Regional Reliability	6/1/2014		$0	$0	$0	$0	$0	$0
11131	Multi - Cushing Area 138 kV	R	Regional Reliability	12/1/2013		$0	$0	$0	$0	$0	$0
11132	Multi - Cushing Area 138 kV	R	Regional Reliability	6/1/2014	$10,600,000	$1,415,287	$828,176	$1,057,577	$1,415,287	$10,600,000	$12,954,802
11133	Multi - Cushing Area 138 kV	R	Regional Reliability	6/1/2014		$0	$0	$0	$0	$0	$0

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11134	Multi - Cushing Area 138 kV	R	Regional Reliability	3/1/2013		$0	$0	$0	$0	$0	$0
11151	Line - Twin Church - S. Sioux City 115 kV	R	Regional Reliability	9/27/2012	$29,030,640	$3,224,816	$3,224,816	$3,224,816	$3,224,816	$27,631,781	$27,454,076
11152	Line - Twin Church - S. Sioux City 115 kV	R	Regional Reliability	12/19/2012		$0	$0	$0	$0	$0	$0
11171	Line - Carthage - Rock Hill 69 kV Ckt 1 rebuild	R	Regional Reliability	6/1/2014	$11,830,128	$1,573,734	$920,894	$1,175,977	$1,573,734	$11,830,128	$14,405,137
11173	XFR - Eddy County 230/115 kV Transformer Ckt 2	R	Regional Reliability	6/6/2013	$4,863,725	$606,494	$606,494	$606,494	$606,494	$4,745,098	$5,357,014
11177	Line - Randall - Amarillo S 230 kV Ckt 1	R	Regional Reliability	5/13/2013	$20,078,082	$2,503,685	$2,503,685	$2,503,685	$2,503,685	$19,588,373	$22,114,440
11182	Sub - Canadian River Substation	R	Regional Reliability	6/30/2013	$9,643,276	$1,256,144	$1,256,144	$1,256,144	$1,256,144	$9,408,074	$11,095,216
11183	Multi - Canadian River - McAlester City - Dustin 138 kV	R	Regional Reliability	5/16/2012	$4,096,000	$518,626	$518,626	$518,626	$518,626	$3,898,632	$4,415,256
11184	Multi - Canadian River - McAlester City - Dustin 138 kV	R	Regional Reliability	2/8/2013	$4,096,000	$531,591	$531,591	$531,591	$531,591	$3,996,098	$4,695,417
11195	Line - Holcomb - Fletcher 115 kV Ckt 1	R	Regional Reliability	12/31/2013	$4,091,866	$1,004,393	$1,004,393	$1,004,393	$1,004,393	$3,992,064	$8,871,561
11311	XFR - Colby 69/34.5 kV TrXFR - Colby 115/34.5 kV Transformer Ckt 4	R	Regional Reliability	5/1/2013	$1,097,586	$148,338	$148,338	$148,338	$148,338	$1,070,816	$1,310,230
11312	Line - MIDW Heizer - Mullergren 115kV	R	Regional Reliability	12/31/2012	$637,135	$84,008	$84,008	$84,008	$84,008	$606,434	$715,191
11316	Line - OXY Permian Sub - Sanger SW Station 115 kV Ckt 1 Reconductor	R	Regional Reliability	6/1/2012	$242,156	$29,460	$29,460	$29,460	$29,460	$230,488	$250,802
11319	Line - Wolford-Yuma 115 kV Ckt 1 Wave Trap	R	Regional Reliability	5/9/2013	$116,520	$14,530	$14,530	$14,530	$14,530	$113,678	$128,338
11321	Multi: Dallam - Channing - Tascosa -Potter	R	Regional Reliability	5/29/2012	$19,180,552	$2,333,430	$2,333,430	$2,333,430	$2,333,430	$18,256,326	$19,865,366
11322	Multi: Dallam - Channing - Tascosa -Potter	R	Regional Reliability	5/23/2012	$3,412,108	$415,103	$415,103	$415,103	$415,103	$3,247,694	$3,533,932
11323	Line - Heizer - Mullergren 115kV	R	Regional Reliability	11/15/2012	$850,000	$189,102	$189,102	$189,102	$189,102	$809,042	$1,609,900
11331	Line - Diana - Perdue 138 kV Reconductor	R	Regional Reliability	12/31/2014	$18,805,489	$2,501,649	$0	$405,487	$2,501,649	$18,805,489	$22,898,793
11339	Line - Classen - Southwest 5 Tap 138 kV	R	Regional Reliability	2/15/2014	$109,481	$14,618	$12,811	$14,618	$14,618	$109,481	$133,802

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11344	Multi - Craig - 87th - Stranger 345 kV Ckt 1	R	Regional Reliability	11/15/2012	$9,866,277	$1,329,311	$1,329,311	$1,329,311	$1,329,311	$9,390,864	$11,316,929
11345	Multi - Craig - 87th - Stranger 345 kV Ckt 1	R	Regional Reliability	11/15/2012	$15,119,789	$2,037,132	$2,037,132	$2,037,132	$2,037,132	$14,391,233	$17,342,872
11346	Multi - Craig - 87th - Stranger 345 kV Ckt 1	R	Regional Reliability	11/15/2012	$12,277,385	$1,654,167	$1,654,167	$1,654,167	$1,654,167	$11,685,792	$14,082,546
11355	XFR - Crosby Co. 115/69 kV Transformers Ckt 1 and Ckt 2	R	Regional Reliability	2/6/2015	$2,378,798	$311,647	$0	$18,836	$280,825	$2,438,268	$2,952,992
11359	Line - Hereford - North-east Hereford 115 kV Ckt 1	R	Regional Reliability	2/11/2014	$4,139,406	$529,078	$469,484	$529,078	$529,078	$4,139,406	$4,842,900
11378	Multi - Cherry Sub add 230kV source and 115 kV Hastings Conver-sion	R	Regional Reliability	5/1/2014	$5,540,583	$708,169	$474,707	$589,492	$708,169	$5,540,583	$6,482,208
11383	Line - North Plainview line tap 115 kV	R	Regional Reliability	1/15/2015	$330,000	$43,233	$0	$5,226	$41,571	$338,250	$409,655
11384	Line - Kress Rural line tap 115 kV	R	Regional Reliability	12/9/2014	$400,000	$51,126	$3,090	$11,377	$51,126	$400,000	$467,980
11389	Multi - Hitchland - Texas Co. 230 kV and 115 kV	R	Regional Reliability	3/19/2013	$1,491,086	$185,935	$185,935	$185,935	$185,935	$1,454,718	$1,642,315
11411	Multi - Mulberry - Franklin - Sheffield 161 kV	R	Regional Reliability	7/25/2014	$6,949,300	$983,699	$429,693	$589,138	$983,699	$6,949,300	$9,004,267
11412	Multi - Mulberry - Franklin - Sheffield 161 kV	R	Regional Reliability	7/25/2014	$1,320,792	$186,963	$81,668	$111,972	$186,963	$1,320,792	$1,711,361
11413	Multi - Mulberry - Franklin - Sheffield 161 kV	R	Regional Reliability	6/4/2014	$8,063,989	$1,141,487	$658,550	$843,572	$1,141,487	$8,063,989	$10,448,579
11421	Line - Hooks - Lone Star Ordinance 69 kV Ckt 1	R	Regional Reliability	9/1/2013	$2,100,000	$272,544	$272,544	$272,544	$272,544	$2,048,780	$2,407,318
11424	Line - Alva - Freedom 69 kV Ckt 1	R	Regional Reliability	3/28/2014	$6,243,750	$1,138,860	$869,789	$1,054,384	$1,138,860	$6,243,750	$10,424,530
11438	Line - Canaday - Lex-ington 115Kv Ckt 1	R	Regional Reliability	4/1/2013	$513,981	$58,522	$58,522	$58,522	$58,522	$501,445	$516,911
11439	Line - OGE Alva - WFEC Alva 69 kV Ckt 1	R	Regional Reliability	11/20/2012	$363,184	$46,155	$46,155	$46,155	$46,155	$345,684	$392,934
11440	PRATT - ST JOHN 115 KV CKT 1	R	Regional Reliability	6/15/2014	$100,000	$23,374	$12,778	$16,567	$23,374	$100,000	$213,950
11444	Multi - Mulberry - Franklin - Sheffield 161 kV	R	Regional Reliability	7/28/2014	$5,348,455	$757,093	$324,469	$447,184	$757,093	$5,348,455	$6,930,039

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11498	Line - Loma Vista East - Winchester Junction North 161kV Ckt 1	R	Regional Reliability	1/14/2013	$176,118	$33,588	$33,588	$33,588	$33,588	$171,822	$296,672
11505	XFR - Spearman 115/69/13.2 Ckt 1 Upgrade	R	Regional Reliability	6/23/2013	$908,719	$113,315	$113,315	$113,315	$113,315	$886,555	$1,000,883
11507	XFR - Lubbock South 230/115/13.2 kV Ckt 2	R	Regional Reliability	2/3/2015	$4,063,897	$532,412	$0	$36,567	$484,144	$4,165,494	$5,044,840
50047	Device - Comanche	R	Regional Reliability	6/1/2012	$350,000	$60,764	$60,764	$60,764	$60,764	$333,135	$517,305
50073	Device - Quapaw Cap 69 kV	R	Regional Reliability	12/1/2012	$622,437	$94,773	$94,773	$94,773	$94,773	$592,444	$806,838
50080	Device - Tahlequah West 69 Cap kV	R	Regional Reliability	7/1/2012	$779,000	$208,559	$208,559	$208,559	$208,559	$741,463	$1,775,537
50092	Device - Jay Cap 69 kV	R	Regional Reliability	6/25/2012	$1,013,318	$271,291	$271,291	$271,291	$271,291	$964,490	$2,309,607
50093	Device - Bushland Interchange 230 kV Capacitor	R	Regional Reliability	12/19/2013	$1,865,510	$232,624	$232,624	$232,624	$232,624	$1,820,010	$2,054,714
50098	Device - Kolache 69 kV Capacitor	R	Regional Reliability	12/31/2013	$737,743	$96,099	$96,099	$96,099	$96,099	$719,749	$848,821
50104	Device - Plainville Cap 115 kV	R	Regional Reliability	3/27/2013	$1,169,968	$266,794	$266,794	$266,794	$266,794	$1,141,432	$2,356,526
50156	Line - Bann - Lone Star Ordinance 69 kV Ckt 1	R	Regional Reliability	6/1/2013	$6,600,000	$856,568	$856,568	$856,568	$856,568	$6,439,024	$7,565,857
50184	Device - Kinsley Capacitor 115 kV	R	Regional Reliability	6/27/2012	$926,685	$122,186	$122,186	$122,186	$122,186	$882,032	$1,040,214
50186	Device - Electra 69 kV Capacitor	R	Regional Reliability	8/31/2012	$240,000	$41,667	$41,667	$41,667	$41,667	$228,435	$354,724
50197	Device-Pawnee 115 kV	R	Regional Reliability	1/31/2013	$712,979	$96,358	$96,358	$96,358	$96,358	$695,589	$851,110
50213	Device - Gordon 115 kV	R	Regional Reliability	6/1/2012	$673,574	$74,823	$74,823	$74,823	$74,823	$641,117	$636,994
50214	Device - Cozad 115 kV	R	Regional Reliability	4/1/2014	$518,350	$60,495	$45,537	$55,343	$60,495	$518,350	$553,739
50246	Device - Johnson Corner 115 kV Capacitor	R	Regional Reliability	5/23/2012	$740,000	$177,211	$177,211	$177,211	$177,211	$704,343	$1,508,663
50247	Device - Johnson Corner 115 kV 2nd Capacitor	R	Regional Reliability	5/23/2012	$370,000	$88,605	$88,605	$88,605	$88,605	$352,171	$754,331
50248	Device - Kearney 115 kV	R	Regional Reliability	6/1/2012	$748,743	$83,173	$83,173	$83,173	$83,173	$712,664	$708,081
50249	Device - Holdrege 115 kV	R	Regional Reliability	6/1/2013	$496,486	$56,530	$56,530	$56,530	$56,530	$484,377	$499,316

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50319	XFR - Ogallala 230/115kV Replacement	R	Regional Reliability	6/1/2014	$4,384,489	$511,700	$299,429	$382,369	$511,700	$4,384,489	$4,683,831
50346	XFR - Paoli 138/69 kV	R	Regional Reliability	3/22/2013	$1,537,212	$200,239	$200,239	$200,239	$200,239	$1,499,719	$1,768,662
50347	Device - Little River Lake 69 kV	R	Regional Reliability	10/1/2012	$530,068	$67,363	$67,363	$67,363	$67,363	$504,527	$573,489
50363	Line - Easton Rec - Knox Lee 138 kV ckt 1	R	Regional Reliability	10/16/2012	$150,000	$18,993	$18,993	$18,993	$18,993	$142,772	$161,692
50364	Line - Easton Rec - Pirkey 138 kV ckt 1	R	Regional Reliability	11/10/2012	$500,000	$63,309	$63,309	$63,309	$63,309	$475,907	$538,972
50365	Line - Pirkey - Whitney 115 kV ckt 1	R	Regional Reliability	2/10/2013	$900,000	$116,805	$116,805	$116,805	$116,805	$878,049	$1,031,708
50397	Line - Cowskin - Centennial 138 kV rebuild	R	Regional Reliability	5/19/2013	$2,038,528	$281,523	$281,523	$281,523	$281,523	$1,988,808	$2,486,625
50398	XFR - Auburn Road 230/115 kV Transformer Ckt 1	R	Regional Reliability	5/28/2014	$32,936,593	$4,662,296	$2,779,446	$3,535,147	$4,662,296	$32,936,593	$42,676,223
50402	Sub - Move lines from Lea Co 230/115 kV sub to Hobbs Interchange 230/115 kV	R	Regional Reliability	5/16/2014	$11,628,992	$1,486,358	$935,099	$1,176,019	$1,486,358	$11,628,992	$13,605,345
50403	Line - Folsom & Pleasant Hill - Sheldon 115 kV Ckt 2	R	Regional Reliability	8/12/2013	$5,197,561	$550,645	$550,645	$550,645	$550,645	$5,070,791	$4,863,710
50405	Device - Coweta 69 kV Capacitor	R	Regional Reliability	6/1/2014	$1,428,440	$190,022	$111,194	$141,994	$190,022	$1,428,440	$1,739,363
50408	Device - Lula 69 kV	R	Regional Reliability	9/23/2013	$737,743	$96,099	$96,099	$96,099	$96,099	$719,749	$848,821
50411	Multi - Ellsworth - Bushton - Rice 115 kV	R	Regional Reliability	9/28/2012	$575,964	$75,942	$75,942	$75,942	$75,942	$548,211	$646,526
50438	Sub - Cornville 138 kV	R	Regional Reliability	12/31/2014	$21,664,838	$2,882,022	$0	$467,141	$2,882,022	$21,664,838	$26,380,523
50448	Multi - Ellsworth - Bushton - Rice 115 kV	R	Regional Reliability	7/10/2012	$2,604,440	$343,402	$343,402	$343,402	$343,402	$2,478,943	$2,923,513
50450	Multi - Kress Interchange - Kiser - Cox 115 kV	R	Regional Reliability	11/21/2014	$6,780,000	$866,585	$95,229	$235,692	$866,585	$6,780,000	$7,932,264
50504	XFR - Howard 115/69 kV Transformers	R	Regional Reliability	12/31/2014	$1,516,548	$193,837	$0	$31,419	$193,837	$1,516,548	$1,774,286
50505	Device - Kingsmill 115 kV Capacitors	R	Regional Reliability	11/14/2014	$937,420	$119,816	$15,471	$34,892	$119,816	$937,420	$1,096,735

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50506	XFR - Grapevine 230/115 kV Transformer Ckt 1	R	Regional Reliability	3/21/2014	$2,505,545	$320,246	$250,742	$302,650	$320,246	$2,505,545	$2,931,364
50507	Device - Howard 115 kV Capacitors	R	Regional Reliability	5/29/2014	$1,256,000	$160,535	$95,263	$121,284	$160,535	$1,256,000	$1,469,458
50512	Device - St. Joe 161 kV	R	Regional Reliability	9/27/2013	$300,109	$37,912	$37,912	$37,912	$37,912	$292,789	$334,868
50519	Line - Pheasant Run - Seguin 115 kV Ckt 1	R	Regional Reliability	7/15/2014	$7,811,905	$1,082,165	$502,434	$677,840	$1,082,165	$7,811,905	$9,905,575
50521	Device - Red Bluff 115 kV Capacitor	R	Regional Reliability	6/20/2013	$1,999,300	$249,308	$249,308	$249,308	$249,308	$1,950,537	$2,202,073
50526	Line - El Paso - Farber 138 kV Ckt 1	R	Regional Reliability	4/8/2014	$3,917,751	$554,572	$406,788	$496,677	$554,572	$3,917,751	$5,076,263
50529	Line - Arcadia - Redbud 345 kV	R	Regional Reliability	11/17/2013	$983,369	$128,095	$128,095	$128,095	$128,095	$959,384	$1,131,430
50531	Line - New Gladewater - Perdue 138 kV	R	Regional Reliability	12/31/2014	$1,000,000	$133,028	$0	$21,562	$133,028	$1,000,000	$1,217,665
50547	Line - Oxy Permian - Sanger Switching Station 115 kV Ckt 1	R	Regional Reliability	5/4/2012	$299,150	$36,393	$36,393	$36,393	$36,393	$284,735	$309,831
50561	XFR - Potash Junction 115/69 kV Ckt 2	R	Regional Reliability	7/24/2014	$2,289,368	$292,615	$128,622	$176,051	$292,615	$2,289,368	$2,678,447
50575	Sub - Sub 1366 161 kV	R	Regional Reliability	5/20/2013	$11,179,602	$1,151,838	$1,151,838	$1,151,838	$1,151,838	$10,906,929	$10,173,908
50586	Multi - Renfrow 345/138 kV substation and Renfrow - Grant 138 kV line	R	Regional Reliability	3/15/2014	$3,079,700	$411,194	$328,730	$395,379	$411,194	$3,079,700	$3,763,859
50587	Multi - Renfrow 345/138 kV substation and Renfrow - Grant 138 kV line	R	Regional Reliability	3/15/2014	$11,659,600	$1,556,763	$1,244,555	$1,496,887	$1,556,763	$11,659,600	$14,249,793
50588	Multi - Renfrow 345/138 kV substation and Renfrow - Grant 138 kV line	R	Regional Reliability	9/15/2014	$4,998,388	$667,373	$196,178	$304,351	$667,373	$4,998,388	$6,108,785
50589	Multi - Renfrow 345/138 kV substation and Renfrow - Grant 138 kV line	R	Regional Reliability	5/1/2014	$1,173,170	$156,639	$105,000	$130,389	$156,639	$1,173,170	$1,433,791
50590	Multi - Renfrow 345/138 kV substation and Renfrow - Grant 138 kV line	R	Regional Reliability	10/1/2014	$4,540,425	$606,227	$151,557	$249,819	$606,227	$4,540,425	$5,549,086
50591	XFR - Howard 115/69 kV Transformers	R	Regional Reliability	9/13/2013	$3,300,000	$411,501	$411,501	$411,501	$411,501	$3,219,512	$3,634,692

UPGRADE ID	PROJECT NAME	REL/ ECO	TYPE	IN-SERVICE DATE	BEST COST	1-YEAR COST	PRORATED COST 2014	3/1/14 - 2/28/15	PRORATED COST 2015	INFLATED COST	40-YEAR NPV
50592	Multi - Renfrow 345/138 kV substation and Renfrow - Grant 138 kV line	R	Regional Reliability	9/1/2014	$587,690	$78,467	$26,084	$38,802	$78,467	$587,690	$718,246
50594	Multi - Cushing Area 138 kV	R	Regional Reliability	3/1/2013		$0	$0	$0	$0	$0	$0
50595	Multi - Renfrow - Wakita - Noel Switch 138 kV	R	Regional Reliability	1/28/2013	$17,928,848	$3,190,460	$3,190,460	$3,190,460	$3,190,460	$17,491,559	$28,180,560
50596	Multi - Renfrow - Wakita - Noel Switch 138 kV	R	Regional Reliability	6/30/2013	$7,220,000	$1,284,808	$1,284,808	$1,284,808	$1,284,808	$7,043,902	$11,348,395
50597	Multi - Renfrow - Wakita - Noel Switch 138 kV	R	Regional Reliability	6/24/2013	$3,573,553	$635,918	$635,918	$635,918	$635,918	$3,486,393	$5,616,910
50610	Line - Buffalo - Buffalo Bear - Ft. Supply 69 kV	R	Regional Reliability	12/19/2014	$1,500,000	$273,600	$9,020	$53,367	$273,600	$1,500,000	$2,504,392
50611	Line - Buffalo - Buffalo Bear - Ft. Supply 69 kV	R	Regional Reliability	12/19/2014	$6,000,000	$1,094,400	$36,079	$213,468	$1,094,400	$6,000,000	$10,017,567
50619	Multi - Renfrow - Wakita - Noel Switch 138 kV	R	Regional Reliability	4/30/2014	$2,000,000	$364,800	$245,538	$304,668	$364,800	$2,000,000	$3,339,189
50622	Multi - Renfrow - Medford Tap - Chikaskia 138 kV	R	Regional Reliability	1/1/2015	$2,056,746	$281,477	$0	$44,851	$281,477	$2,108,165	$2,667,121
50627	Multi - Renfrow - Medford Tap - Chikaskia 138 kV	R	Regional Reliability	1/1/2015	$5,256,327	$719,358	$0	$114,623	$719,358	$5,387,735	$6,816,234
50629	Multi - Renfrow - Medford Tap - Chikaskia 138 kV	R	Regional Reliability	1/1/2015	$3,041,661	$416,268	$0	$66,328	$416,268	$3,117,703	$3,944,327
50630	Multi - Renfrow - Medford Tap - Chikaskia 138 kV	R	Regional Reliability	5/1/2014	$185,400	$24,754	$16,593	$20,606	$24,754	$185,400	$226,587
50634	Line - Hays Plant - Vine Street 115 kV Ckt 1	R	Regional Reliability	10/1/2014	$15,720	$2,178	$544	$897	$2,178	$15,720	$19,933
50704	Line - Maxwell - North Platt 115 kV Ckt 1	R	Regional Reliability	1/1/2014	$25,767	$3,007	$3,007	$3,007	$3,007	$25,767	$27,526
50741	XFR - Harrisonville 161/69 kV Ckt 2	R	Regional Reliability	2/10/2014	$2,773,480	$359,126	$319,662	$359,126	$359,126	$2,773,480	$3,287,254
50762	XFR - Harrisonville 161/69 kV Ckt 2	R	Regional Reliability	4/14/2014	$1,005,220	$130,162	$93,330	$114,428	$130,162	$1,005,220	$1,191,432
10374	Line - Valliant Substation - Install 345 kV terminal equipment	R	Transmission Service	4/17/2012	$3,840,000	$486,212	$486,212	$486,212	$486,212	$3,654,967	$4,139,303

UPGRADE ID	PROJECT NAME	REL/ ECO	TYPE	IN-SERVICE DATE	BEST COST	1-YEAR COST	PRORATED COST 2014	3/1/14 - 2/28/15	PRORATED COST 2015	INFLATED COST	40-YEAR NPV
10405	Line - Valliant - Hugo 345 kV	R	Transmission Service	6/8/2012	$23,189,835	$5,159,122	$5,159,122	$5,159,122	$5,159,122	$22,072,419	$43,921,554
10406	XFR - Hugo 345/138 kV	R	Transmission Service	6/30/2012	$6,328,605	$1,407,946	$1,407,946	$1,407,946	$1,407,946	$6,023,657	$11,986,380
10410	Line - South Hays - Hays Plant - Vine St. 115 kV Ckt 1 #2	R	Transmission Service	6/1/2012	$35,000	$4,615	$4,615	$4,615	$4,615	$33,314	$39,288
10456	Multi - McNab REC - Turk 115 kV	R	Transmission Service	6/30/2012	$7,310,000	$925,575	$925,575	$925,575	$925,575	$6,957,763	$7,879,766
10467	XFR - Anadarko 138/69 kV	R	Transmission Service	12/4/2012	$2,000,000	$347,222	$347,222	$347,222	$347,222	$1,903,629	$2,956,031
10487	Line - Creswell - Oak 69 kV Ckt 1	R	Transmission Service	11/8/2013	$150,000	$20,715	$20,715	$20,715	$20,715	$146,341	$182,972
10488	XFR - Rose Hill 345/138 kV Ckt 3	R	Transmission Service	5/30/2013	$7,395,975	$1,021,393	$1,021,393	$1,021,393	$1,021,393	$7,215,585	$9,021,712
10876	XFR - 3rd Arcadia 345/138 kV	R	Transmission Service	6/1/2012	$10,550,000	$1,340,737	$1,340,737	$1,340,737	$1,340,737	$10,041,642	$11,414,197
10994	XFR - Medicine Lodge 138/115 kV	R	Transmission Service	2/1/2013	$10,619,760	$2,421,680	$2,421,680	$2,421,680	$2,421,680	$10,360,741	$21,390,109
11200	Line - Clifton - Greenleaf 115 kV	R	Transmission Service	1/31/2013	$5,114,563	$1,166,301	$1,166,301	$1,166,301	$1,166,301	$4,989,818	$10,301,651
11201	Line - Flatridge - Medicine Lodge 138 kV	R	Transmission Service	1/20/2014	$4,631,255	$1,082,492	$1,025,988	$1,082,492	$1,082,492	$4,631,255	$9,908,565
11202	Line - Flatridge - Harper 138 kV	R	Transmission Service	6/20/2013	$11,008,945	$2,510,428	$2,510,428	$2,510,428	$2,510,428	$10,740,434	$22,173,998
11203	Line - Medicine Lodge - Pratt 115 kV	R	Transmission Service	5/16/2014	$13,645,827	$3,189,523	$2,006,596	$2,523,579	$3,189,523	$13,645,827	$29,195,231
11204	Line - Macarthur - Oatville 69 kV Ckt 1	R	Transmission Service	3/12/2012	$0	$0	$0	$0	$0	$0	$0
11262	Line - Arcadia - OMPA Edmond Garber 138 kV Ckt 1	R	Transmission Service	6/18/2012	$30,000	$3,813	$3,813	$3,813	$3,813	$28,554	$32,457
11314	Line - Jones Station Bus#2 - Lubbock South Interchange 230 kV CKT 2 terminal upgrade	R	Transmission Service	1/13/2015	$190,000	$24,892	$0	$3,146	$24,071	$194,750	$235,862
11342	Line - Greenleaf - Knob Hill 115kV Ckt 1	R	Transmission Service	1/31/2013	$4,462,093	$1,017,515	$1,017,515	$1,017,515	$1,017,515	$4,353,261	$8,987,459
11347	Line - Southwest Shreveport - Springridge REC 138 kV	R	Transmission Service	6/1/2013	$7,200,000	$934,438	$934,438	$934,438	$934,438	$7,024,390	$8,253,662
11348	Line - Eastex - Whitney 138 kV Accelerated	R	Transmission Service	6/1/2013	$2,800,000	$363,393	$363,393	$363,393	$363,393	$2,731,707	$3,209,758

UPGRADE ID	PROJECT NAME	REL/ ECO	TYPE	IN-SERVICE DATE	BEST COST	1-YEAR COST	PRORATED COST 2014	3/1/14 - 2/28/15	PRORATED COST 2015	INFLATED COST	40-YEAR NPV
11350	ALTUS SW - NAVAJO 69KV CKT 1	R	Transmission Service	6/1/2013	$150,000	$26,693	$26,693	$26,693	$26,693	$146,341	$235,770
11351	G03-05T - PARADISE 138KV CKT 1	R	Transmission Service	12/4/2012	$150,000	$26,042	$26,042	$26,042	$26,042	$142,772	$221,702
50148	Line - Turk - NW Texarkana 345 kV	R	Transmission Service	8/28/2012	$44,200,000	$5,596,498	$5,596,498	$5,596,498	$5,596,498	$42,070,196	$47,645,097
50149	Line - Turk - NW Texarkana 345 kV	R	Transmission Service	8/28/2012		$0	$0	$0	$0	$0	$0
50150	Line - Turk - NW Texarkana 345 kV	R	Transmission Service	8/28/2012		$0	$0	$0	$0	$0	$0
50160	Line - Linwood - Powell Street 138 kV	R	Transmission Service	6/1/2012	$456,000	$57,738	$57,738	$57,738	$57,738	$434,027	$491,542
50164	Line - SE Texarkana - Texarkana Plant 69 kV	R	Transmission Service	3/1/2012	$128,000	$16,207	$16,207	$16,207	$16,207	$121,832	$137,977
50165	Line - South Texarkana REC - Texarkana Plant 69 kV	R	Transmission Service	5/30/2012	$8,193,000	$1,037,378	$1,037,378	$1,037,378	$1,037,378	$7,798,215	$8,831,590
50169	Multi - Hugo - Sunnyside 345 kV (OGE)	R	Transmission Service	4/1/2012	$156,900,000	$19,939,486	$19,939,486	$19,939,486	$19,939,486	$149,339,679	$169,752,366
50171	Multi - Hugo - Sunnyside 345 kV (OGE)	R	Transmission Service	4/1/2012		$0	$0	$0	$0	$0	$0
50172	Line - VBI - VBI North 69 kV	R	Transmission Service	6/1/2014	$100,000	$13,352	$7,813	$9,977	$13,352	$100,000	$122,215
50173	Line - Hugo - Sunnyside 345 kV	R	Transmission Service	6/8/2012	$6,775,042	$1,507,267	$1,507,267	$1,507,267	$1,507,267	$6,448,583	$12,831,932
50228	Multi - Green - Coffey County No. 3 - Burlington Junction - Wolf Creek 69 kV	R	Transmission Service	12/18/2012	$4,380,845	$590,244	$590,244	$590,244	$590,244	$4,169,751	$5,024,967
50229	Device - Allen 69 kV Capacitor	R	Transmission Service	5/31/2012	$1,405,967	$189,430	$189,430	$189,430	$189,430	$1,338,220	$1,612,688
50231	Device - Athens 69 kV Capacitor	R	Transmission Service	10/14/2013	$700,000	$96,671	$96,671	$96,671	$96,671	$682,927	$853,870
50233	Multi - Green - Coffey County No. 3 - Burlington Junction - Wolf Creek 69 kV	R	Transmission Service	6/23/2014	$3,027,106	$428,498	$224,844	$294,298	$428,498	$3,027,106	$3,922,247
50234	Multi - Green - Coffey County No. 3 - Burlington Junction - Wolf Creek 69 kV	R	Transmission Service	10/1/2013	$3,535,570	$488,266	$488,266	$488,266	$488,266	$3,449,337	$4,312,737
50236	Multi - Green - Coffey County No. 3 - Burlington Junction - Wolf Creek 69 kV	R	Transmission Service	7/16/2014	$6,726,750	$952,196	$439,475	$593,815	$952,196	$6,726,750	$8,715,907

UPGRADE ID	PROJECT NAME	REL/ ECO	TYPE	IN-SERVICE DATE	BEST COST	1-YEAR COST	PRORATED COST 2014	3/1/14 - 2/28/15	PRORATED COST 2015	INFLATED COST	40-YEAR NPV
50240	Multi - Green - Coffey County No. 3 - Burlington Junction - Wolf Creek 69 kV	R	Transmission Service	3/29/2012	$1,693,501	$228,170	$228,170	$228,170	$228,170	$1,611,899	$1,942,499
50284	Device - Dearing 138 kV Capacitor	R	Transmission Service	6/30/2013	$581,038	$80,242	$80,242	$80,242	$80,242	$566,866	$708,758
50327	Line - East Manhattan - NW Manhattan 230 kV Ckt 1	R	Transmission Service	3/19/2012	$199,416	$26,868	$26,868	$26,868	$26,868	$189,807	$228,736
50329	Line - Stillwell - West Gardner 345 kV Ckt 1	R	Transmission Service	2/1/2013	$457,827	$87,313	$87,313	$87,313	$87,313	$446,661	$771,214
50375	XFR - Diana 345/138 kV ckt 3	R	Transmission Service	6/1/2013	$5,500,000	$713,807	$713,807	$713,807	$713,807	$5,365,854	$6,304,881
50498	Line - Greenleaf - Knob Hill 115 kV CKT 1 WR	R	Transmission Service	3/1/2013	$329,538	$45,510	$45,510	$45,510	$45,510	$321,500	$401,975
50368	Sub - Chapman Junction 115 kV	R	Zonal Reliability	12/7/2012	$5,425,273	$730,962	$730,962	$730,962	$730,962	$5,163,853	$6,222,958
50369	Sub - Clay Center Junction 115 kV	R	Zonal Reliability	12/7/2012	$2,849,367	$383,903	$383,903	$383,903	$383,903	$2,712,069	$3,268,313
50370	Device - Chapman Junction 115 kV Capacitor	R	Zonal Reliability	11/6/2012	$406,402	$54,756	$54,756	$54,756	$54,756	$386,819	$466,156
50371	Line - Clay Center Junction - Clay Center Switching Station 115 kV	R	Zonal Reliability	12/7/2012	$7,476,811	$1,007,372	$1,007,372	$1,007,372	$1,007,372	$7,116,536	$8,576,137
50373	Sub - Clay Center Switching Station 115 kV	R	Zonal Reliability	12/7/2012	$2,774,851	$373,864	$373,864	$373,864	$373,864	$2,641,143	$3,182,841
50383	Device - Northwest Manhattan 115 kV Capacitor	R	Zonal Reliability	10/10/2012	$957,660	$129,028	$129,028	$129,028	$129,028	$911,515	$1,098,466

REL/ ECO	TYPE		BEST COST	1-YEAR COST	PRORATED COST 2014	3/1/14 - 2/28/15	PRORATED COST 2015		40-YEAR NPV
	Total		**$3,411,660,964**						
E	Economic Total		$1,590,690,489		$129,053,708	$161,750,083	$269,969,225		$2,434,836,003
X	GI Total		$175,636,492	1-Year Cost	$22,087,743	$23,187,672	$27,275,612		$238,205,412
R	Reliability Total		$1,645,333,984	$231,421,630	$187,345,196	$199,875,039	$231,340,056		$2,041,188,617

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