High Priority Incremental Load Study Report

April 2, 2014

HPILS Task Force

SPP Southwest Power Pool

Revision History

Date	Author	Change Description
02/24/2014	SPP Staff	Initial Draft Report Outline
03/12/2014	SPP Staff	First Draft Report Submission to the HPILS Task Force
03/18/2014	SPP Staff	Second Draft Report Posted
03/21/2014	SPP Staff	Third Draft Report for TWG Posting
03/24/2014	SPP Staff	Fourth Draft Report for 3/28 TWG Conference Call
03/26/2014	SPP Staff	Fifth Draft Report for HPILS Task Force Approval
04/01/2014	SPP Staff	Sixth Draft Report for TWG Approval
04/02/2014	SPP Staff	Final Report Approved by HPILS Task Force

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Executive Summary

Southwest Power Pool's High Priority Incremental Load Study (HPILS) evaluated transmission needs resulting from significant incremental load growth expectations in certain parts of SPP. In April 2013, the SPP Board of Directors directed this study be performed in response to concerns about oil and gas shale play developments, and other future load additions in the region that had not been accounted for in previous planning efforts or in models being used in planning efforts underway at the time. By directing this out-of-cycle study, the Board recognized the need to cost-effectively address system needs in a timely manner that could not otherwise be accomplished by waiting upon completion of SPP's next scheduled planning efforts that would incorporate these load growth assumptions.

HPILS was conducted in accordance with the high priority study provisions outlined in the SPP Open Access Transmission Tariff (OATT) and the HPILS scope document approved by the Transmission Working Group (TWG) and the Markets and Operations Policy Committee (MOPC) in June and July, 2013, respectively. In accordance with the HPILS scope, a cost effective transmission plan was developed to address reliability needs over a 10-year period under updated load growth and corresponding generation expansion assumptions. The HPILS also reevaluated three projects[1] previously approved in the 2012 Integrated Transmission Plan 10-Year Assessment (ITP10) for which Notifications to Construct with Conditions (NTC-Cs) had been suspended by the Board in April 2013, pending further evaluation. The study included an evaluation of project costs and economic benefits under selected scenarios and sensitivities. HPILS included the economic analysis of the total portfolio as well as the incremental benefit of the suspended NTC-C for the Tuco-Amoco-Hobbs or equivalent solutions.

This report documents the HPILS findings and recommendations from analyses that concluded in March 2014.

Notifications to Construct (NTCs)[2] are recommended for those new transmission expansion projects identified by the HPILS as needed within the next three years, i.e., 2015-2017, and for those projects requiring a financial commitment, based on need dates and lead times, prior to earliest issuance of NTCs from the next ITP assessments, currently estimated to be August 2015. The NTC projects do not include direct assignment or radial facilities.

The total cost[3] of the projects for which new NTCs are recommended is estimated to be $573 M (million). Regarding the three NTC-Cs that were re-evaluated as part of this study, it was determined that the Tuco – New Deal 345 kV and Grassland – Wolfforth 230 kV projects were no longer needed. As a result, the associated NTC-Cs should be withdrawn, which removes $114 M from the SPP Transmission Expansion Plan (STEP).

[1] The three projects with NTC-Cs that were suspended pending further evaluation included the 1) Tuco-Amoco-Hobbs 345 kV, 2) Tuco-New Deal 345 kV, and 3) Grassland-Wolfforth 230 kV projects.

[2] The term NTC will be used generically throughout this report although, for some of the recommended projects, NTC-Cs would be issued pursuant to Business Practice 7060.

[3] Unless otherwise specified, all costs are Engineering and Construction costs in 2014 dollars.

HPILS identified the Tuco-Yoakum-Hobbs 345 kV project as a better performing and lower cost alternative to the Tuco-Amoco-Hobbs 345 kV project. It is recommended that the Tuco-Amoco-Hobbs NTC-C be modified to reflect the Tuco-Yoakum-Hobbs project with a 2020 in-service date at a cost savings of at least $20 M.

The HPILS Portfolio's impact on the approved STEP is shown in Table E.1 below.

Project Category	Cost Estimate
New NTC Projects	**$573 M**
Withdrawal of Suspended NTC-C for Tuco - New Deal	**($57 M)**
Withdrawal of Suspended NTC-C for Grassland - Wolfforth	**($57 M)**
Modification of Suspended NTC-C for Tuco-Amoco-Hobbs	**($258 M)**
Reinstate NTC-C for Tuco-Yoakum-Hobbs	**$238 M**
HPILS Impact on STEP	**$439 M**

Table E.1: HPILS Portfolio Impact on STEP

The economic analysis showed that the HPILS Portfolio with the Tuco-Yoakum-Hobbs project provides an incremental one-year savings in Adjusted Production Costs (APC) of $168 M (2023 dollars) and the expected reliability benefits of $439 M (current dollars). The Tuco-Yoakum-Hobbs solution provided the highest incremental savings in APC compared to the Yoakum-Hobbs and Tuco-Amoco-Hobbs solutions, hence its selection.

The HPILS recommended plan through 2023 is projected to include 200 projects with a total cost of approximately $1.5 B.

Figure E.1 and Table E.2 illustrate the HPILS Portfolio costs by new NTCs, NTC-C Modify, Direct Assigned and other project categories.

"New NTC" represents projects that did not previously have an NTC issued that were identified in the HPILS process. "NTC-C Modify" represents projects with previously issued or suspended NTC-Cs that were modified or accelerated in the HPILS/ITPNT process.

NTCs will be issued for all projects shown below as new NTC and NTC-C Modify, as well as projects designated as being Direct Assigned. Projects with new NTC and NTC-C Modify will be Base Plan funded. Projects shown as TBD (To Be Determined) are uncertain. Projects in the Others category are part of the HPILS Portfolio which did not need immediate commitment and can be re-evaluated in future ITP studies.

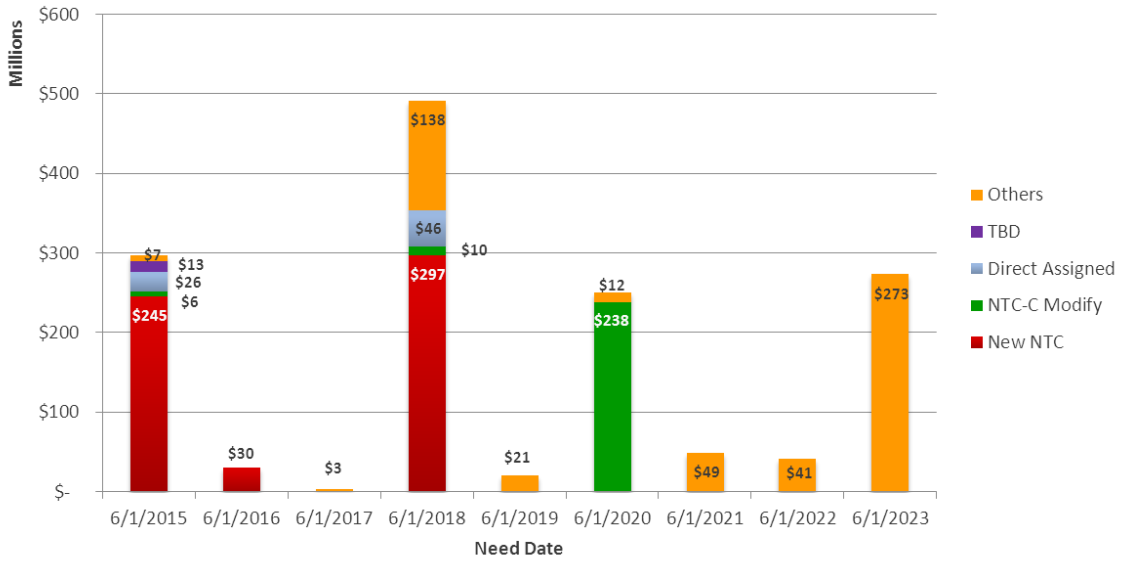


Figure E.1: HPILS Portfolio Costs by Need Year ($ millions)

Need Year	New NTC	NTC-C Modify	Direct Assigned	TBD	Others	Total
2015	245	6	26	13	7	296
2016	30					30
2017					3	3
2018	297	10	46		138	491
2019					21	21
2020		238			12	250
2021					49	49
2022					41	41
2023					273	273
Total	**573**	**253**	**72**	**13**	**544**	**1455**

Table E.2: HPILS Portfolio Costs by Need Year ($ millions)

HPILS created an effective 10-year plan for the SPP footprint based on current expected load growth projections which identifies solutions to potential issues for system intact and (N-1) conditions, and provides some solutions to be considered in the upcoming ITP10 to address needs beyond the near-term future. Since HPILS only looked at steady-state needs based on N-1 reliability requirements, additional refinements of upgrades planned for the out years may be needed in future studies that evaluate system dynamics, as well as voltage stability needs for load pockets. The projects identified for NTCs all assumed single circuit design. Some of these may need to be reevaluated by the NTC recipient for double circuit design construction to minimize land use, expedite approvals and reduce overall costs while meeting applicable reliability standards.

Finally, it may be prudent to consider flexibility in acquiring ROW for certain corridors given the ultimate long-term needs for this area. It is important to note that the HPILS growth areas in Southeast New Mexico have the highest solar potential in the Eastern Interconnection. As a result, SPP needs to consider the implications of rightsizing all enabling transmission infrastructure in this region.

PART I: STUDY PROCESS

1 Introduction

1.1 Study Objective

This report summarizes the High Priority Incremental Load Study (HPILS) that was undertaken to develop a transmission plan to address the needs associated with projected oil and gas development loads in SPP, along with any other load additions expected in the footprint. The assessment identified a robust and flexible transmission plan that is capable of reliably and economically providing deliverability of energy to the SPP market.

1.2 How to Read This Report

1.2.1 Report Sections

This report is divided into multiple sections, grouped into four main parts.

- Part I addresses the concepts behind this study's approach, key procedural steps in development of the analysis, and overarching assumptions used in the study.
- Part II demonstrates the findings of the study, empirical results, and conclusions.
- Part III addresses the portfolio specific results, describes the projects that merit consideration, and contains the recommendation of the Task Force, expected benefits, and costs.
- Part IV contains detailed data and holds the report's appendix material.

1.2.2 SPP Footprint

Within this study, any reference to the SPP footprint refers to the Regional Transmission Organization (RTO) Balancing Authorities and Transmission Owners (TOs)[4] representing members of the SPP organization unless otherwise noted. Energy markets were similarly modeled for other RTOs in the Eastern Interconnection. Notably, AECI and Entergy operated as stand-alone entities in order to reflect their current operating characteristics and commitments.

1.2.3 Supporting Documents

The development of this study was guided by the supporting documents noted below. These living documents provide structure for this assessment:

- High Priority Incremental Load Study scope of work[5]
- SPP Metrics Task Force Report

All referenced reports and documents contained in this report are available on SPP.org.

1.2.4 Confidentiality and Open Access

Proprietary information is frequently exchanged between SPP and its stakeholders in the course of any study, and was extensively used during the HPILS process. This report does not contain confidential marketing data, pricing information, marketing strategies, or other data considered not acceptable for release into the public domain. This report does disclose planning and operational matters, including the

[4] SPP.org > About > Fast Facts > Footprints

[5] http://www.spp.org/publications/2013%20HPILSTF%20Scope%20Final%20TWG%20&%20ESWG.pdf

outcome of certain contingencies, operating transfer capabilities, and plans for new facilities that are considered non-sensitive data.

1.3 Process Development

The HPILS process was driven by the HPILS Task Force, which was created by the Transmission Working Group (TWG) to address transmission expansion needs to address recent oil and gas development loads, as well as interruptible loads that have firmed up, and other expected load additions may not be accurately reflected in current SPP models and studies. The input assumptions developed for the HPILS were refined through the various stakeholder groups, in particular the TWG and Economic Studies Working Group (ESWG).

The HPILS followed the Synergistic Planning Project Team (SPPT) planning principles, which emphasize the need to develop a transmission backbone large enough in both scale and geography to provide flexibility to meet SPP's future needs. This HPILS report addressed the following SPPT's goals:

- Focus on regional needs.
- Utilize a value-based approach that analyzes the transmission system needs through 2023 based on readily available models.
- Identify 100 kV and above solutions based on the reliability analysis for incorporation into the 2015 ITP10 plan.
- Integrate projects from other planning studies with the necessary 100 kV and above facilities to incorporate such needs as:
    - Resolving potential N-1 steady state criteria violations
    - Mitigating known or foreseen congestion
    - Improve access to markets
    - Improving interconnections
    - Focus on the most likely load growth scenario developed for HPILS and consider transmission expansion needs to address 90/10 conditions to ensure that the expected plan is robust and cost effective.
- Further refine and establish the timing of HPILS projects through economic and reliability analysis.

1.4 Printing

This report contains the ITPNT and HPILS Project Lists which are sized for 11 x 17 inch paper. It is recommended that the reader print the document with the output paper size explicitly set 8 ½ x 11 inches and zoom level set to auto to ensure seamless print jobs for the report and list. The list can be printed separately on 11 x 17 inch paper.

2 Consistency with the ITP10 and ITPNT

2.1 HPILS Goals

The High Priority Incremental Load Study (HPILS) was undertaken to develop a transmission plan to address the needs associated with projected oil and gas development loads in SPP, along with other expected incremental load additions. The HPILS was initiated ahead of the 2015 Integrated Transmission Plan 10-Year Assessment (ITP10) schedule due to the timing of the some of the incremental loads projected in some of the SPP regions. However, the HPILS process was coordinated with the ITP process to facilitate consistency where possible.

2.2 HPILS Portfolio

The HPILS Portfolio includes all new projects identified in the HPILS process, which also include transmission projects required for load connections, to serve the 50/50 load forecasts[6] but excludes all projects identified through the 2014 Integrated Transmission Plan Near-Term Assessment (ITPNT) process. Any additional projects required for the 90/10 load forecasts[7] were developed and are presented separately.

2.3 How the HPILS fits into the 2015 ITP10

The HPILS shares several assumptions which are also consistent with the 2015 ITP10 study process. These include the load forecast assumptions which are discussed in further detail in *4 Load and Generation Outlook*. Since the HPILS process was initiated prior to the 2015 ITP10 process, the intent was to include the approved NTCs and modified NTC-Cs from the HPILS Portfolio, as the starting point for the base cases used in the 2015 ITP10 study.

2.4 HPILS Consistency with the 2014 ITPNT

The HPILS Scope was limited to reliability assessments on Scenario Zero models, unlike ITPNT Studies which consider Scenario Zero and Scenario Five models[8]. There was significant overlap regarding projects in both 2014 ITPNT and HPILS. During the development of the HPILS projects, the reliability needs and project development options were compared to the reliability issues identified in the ongoing 2014 ITPNT study. The result of the collaboration in the two processes was the identification of projects developed during the 2014 ITPNT study process that were also needed in the HPILS. Table 2.1 below contains the list of major HPILS projects issued NTCs through the 2014 ITPNT study.

[6] The 50/50 Load Forecast Probability is the 50% probability that the actual load will exceed the forecasted load in the 2015, 2018 or 2023 study years

[7] The 90/10 Load Forecast Probability is the 10% probability that the actual load will exceed the forecasted load in the 2015, 2018 or 2023 study years

[8] Scenario Zero reflects expected transactions, while Scenario Five reflects all committed firm service

Facility Owner	Upgrade Name
WR	East Manhattan - Jeffrey Energy Center 230 kV Ckt 1 Rebuild
SPS	Newhart 230/115 kV Transformer Ckt 2
WFEC	Mustang - Sunshine Canyon 69 kV Ckt 1
SPS	NE Hereford - Centre Street 115 KV Ckt 1
AEP	Welsh Reserve - Wilkes 138KV Ckt 1 Rebuild
NPPD	Hoskins - Neligh 345 kV Ckt 1
NPPD	Neligh 345/115 kV Substation
NPPD	Neligh 115 kV Terminal Upgrades
WR	Sumner County - Viola 138kV Ckt 1
SPS	Quahada Switching Station 115 kV
WR	McDowell Creek Switching Station 115kV Terminal Upgrades
WR	Neosho 138/69kV Transformer Ckt 1
AEP	Chapel Hill REC - Welsh Reserve 138 kV Rebuild Ckt 1
WFEC	Sandy Corner 138kV
SEPC	Mingo 115 kV Capacitor Bank
NPPD	Maxwell - North Platt 115 kV Terminal Upgrades
WR	Clay Center Switching Station 115kV Capacitor Bank
AEP	Broadmoor - Fort Humbug 69 kV Rebuild Ckt 1
AEP	Dangerfield - Jenkins REC T 69 kV Rebuild Ckt 1
AEP	Hallsville - Longview Heights 69 kV Rebuild Ckt 1
AEP	Hallsville-Marshall 69 kV Rebuild Ckt 1
SPS	CV Pines - Capitan 115 kV Conversion Ckt 1
SPS	Bailey County - Bailey Pump 115 kV Ckt 1
SPS	Bailey Pump - Sundan Rural 115 kV Ckt 1
WR	Crestview - Northeast 69 kV Ckt 1
SPS	Lamb County Sandhill 116/69 kV transformer
SPS	Sudan Rural - Lamb Co REC Sandhill 115 kV Ckt 1
WR	Kenmar - Northeast 69 kV Rebuild Ckt 1
SPS	Lamb Co REC Sandhill - Amherst 115 kV Ckt 1
SPS	Amherst - West Littlefield 115 kV Ckt 1
SPS	West Littlefield - Lamb County 115 kV Conversion Ckt 1
OGE	County Line 69 kV Capacitor
SEPC	Ruleton 115 Cap Bank
NPPD	Broken Bow Wind - Ord 115 kV Ckt 1
OGE	Knobhill 138/12.5 kV Transformer
OGE	Ahloso - Park Lane 138 kV conversion Ckt 1
OGE	Ahloso - Harden City 138 kV conversion Ckt 1
OGE	Harden City - Frisco 138 kV conversion Ckt 1
OGE	Frisco - Lula 138 kV conversion Ckt 1
OPPD	S907 - S919 69 kV Ckt 1 Rebuild

Table 2.1: 2013 2014 ITPNT Projects Needed in HPILS

HPILS identified two projects with a 2015 need date, which is one year sooner than the 2014 ITPNT need date for the (1) County Line 69kV and the (2) Ruleton 115 kV capacitor banks. HPILS

recommends these NTC's be modified to accelerate the in-service dates to 2015, because there is not adequate time for these projects to be re-assessed in the 2015 ITPNT.

3 Stakeholder Collaboration

Assumptions and procedures for the HPILS were developed through Task Force and related SPP stakeholder meetings that took place in 2013 and 2014. The assumptions were presented and discussed through many meetings with members, liaison-members, stakeholders, industry specialists, and consultants to provide a thorough evaluation of those assumptions. Groups involved in the development included the following: HPILS Task Force (HPILS TF), Transmission Working Group (TWG), Economic Studies Working Group (ESWG), Cost Allocation Working Group (CAWG), Markets and Operations Policy Committee (MOPC), the SPP Board of Directors (BOD), and the SPP Regional State Committee (RSC).

The TWG and ESWG provided technical guidance and review for inputs, assumptions, and findings. Policy level considerations were tendered to groups including the MOPC, RSC, and BOD. Stakeholder feedback was key to the selection of the HPILS Portfolio and recommendations regarding NTC projects.

- The TWG was responsible for technical oversight of the load forecasts, transmission topology inputs, constraint selection criteria, reliability assessments, transmission project designs, and the report.
- The ESWG was responsible for technical oversight of the economic modeling assumptions, futures, resource plans and siting of renewable resources, metric development and usage, congestion analysis, economic model review, and calculation of benefits.
- The strategic guidance for the study was provided by the MOPC, BOD and RSC.

3.1 Significant Meetings

In addition to the HPILS TF meetings, as well as standard working group meetings, HPILS updates were provided at key SPP stakeholder forums like the Transmission Planning Summit, as well as the RSC educational session to elicit further input and provide stakeholders with a chance to interact with staff on all related planning topics.

- The key drivers developed by the stakeholders and preliminary assumptions regarding load and capacity additions were presented at the Planning Summit on Nov 19, 2013.
- Potential reliability solutions along with potential economic upgrades were presented at HPILS TF meetings, as well as subsequent TWG, ESWG and CAWG meetings.
- Recommended solutions regarding reliability needs and economic analysis results were presented at HPILS TF Meeting on March 5, 2014.

3.2 Project Cost Overview

Project costs utilized in the HPILS were developed in accordance with the guidelines specified in SPP OATT Business Practice 7060, *Notification to Construct and Cost Estimating Processes*. Conceptual Estimates were prepared by SPP staff based on historical cost information stored in SPP's project tracking database. SPP staff requested the designated TOs provide Study Estimates for the projects most

likely to receive NTCs. A Study Estimate is expected to be accurate within a ±30% bandwidth of the actual cost of the project.

3.3 Metric Development and Usage

The metric used to measure the value of specific HPILS projects were further refined by staff and the HPILS TF. SPP staff supporting the ESWG were engaged throughout the HPILS and helped develop the models and appropriate metrics to be considered. The metric used in this study is Adjusted Production Cost (APC) Savings.

3.4 Monetized Cost Benefits

APC savings were calculated in the annual security constrained economic simulations. The production costs, purchases, and sales of all energy within SPP and its neighboring regions were tracked under specific project scenarios.

4 Load and Generation Outlook

As discussed in *Section 1.1 Study Objective* above, the main driver for the HPILS was the increase in load forecasts associated with oil/gas shale plays and other development, as well as interruptible loads that have firmed up recently, and may not be accurately reflected in the previous cycles of the SPP planning process - models and studies. The load forecasts reflected in HPILS formed the basis for the development of transmission expansion needs required to address the recent load developments in a manner that will accommodate the incorporation and timing of these facility connections. For more information on the oil/gas shale play and impacts on load in New Mexico see Appendix F.

This section presents the uncertainties associated with the load forecasts and the corresponding generation resources added to the models to serve the load.

4.1 Uncertainty and Important Issues

A key challenge in designing a transmission expansion plan to meet future needs for HPILS is the difficulty to accurately predict future demand and associated resources. HPILS scope was different than ITP10 plans in that Load Serving Entities (LSE) were responsible for determining resource additions as well as transactions to address future loads in the HPILS. A key sensitivity for HPILS was consideration of 90/10 load projections (10% probability that actual demand will exceed forecasted values) as well as updated 50/50 load projections to reflect the best estimates of expected load projections with an equal probability that actual loads will exceed or not projected values. Inputs and review of study assumptions and results by non-SPP members like KAMO with HPILS load additions on transmission facilities of GRDA in Oklahoma and served by AECI resources were incorporated into the HPILS. Solicitations were made to stakeholders including the RSC regarding additional sensitivities that need to be considered in developing robust plans for the HPILS. The CAWG did not identify any additional sensitivity that should be evaluated as part of the HPILS.

4.2 Load Forecast Descriptions

Two load forecasts were submitted for each of the study years 2015, 2018, and 2023 by the modeling contacts for each planning areas. The two load forecasts were based on two load probability assumptions; the 50/50 load forecast probability and the 90/10 load forecast probability. The 50/50 and 90/10 load forecasts represent the incremental load projections relative to the respective study base models. In addition to the incremental load forecasts, load forecast corrections for the base models were also submitted to account for updates in the base load projections.

For the 2015 study models, the base model used was from the 2013 series of models that were used for the 2014 ITPNT. For the 2018 and 2023 study models, the base models were from the 2012 series of models that were used in SPP's Regional Cost Allocation Review (RCAR) assessment. For all three study years, Summer Peak models were used.

Since coordination and cooperation from load serving entities were critical success factors for this HPILS, stakeholders reviewed the final projected peak load forecasts modeled in each of the study areas.

The two load forecast probabilities, defined in more detail below, provide different perspectives on the development of loads in the region that could impact the development of transmission.

4.2.1 Forecast 1: 50/50 Load Forecast Probability

The 50/50 Load Forecast Probability is the 50% probability that the forecasted model load will exceed the actual load in the 2015, 2018, or 2023 study years. The 50/50 load forecast is also referred to as the expected load forecast and is the lower of the two load forecasts. The ERAG MMWG Procedure Manual (May 07, 2009) states: "The power flow model will be based on a load forecast which assumes a statistical probability of one occurrence in two years (50/50)."

4.2.2 Forecast 2: 90/10 Load Forecast Probability

The 90/10 Load Forecast Probability is the 10% probability that the actual load will exceed the forecasted load in the 2015, 2018, or 2023 study years. The 90/10 load forecast is also considered the less likely load scenario and is the higher of the two load forecasts.

Figure 4.1 below illustrates the 50/50 and 90/10 load forecast probabilities in comparison to the base load forecasts.

[7] SPP Regional Cost Allocation Review Report, Section 4. Fuel Costs, October 8, 2013. http://www.spp.org/publications/RCAR%20Report%20FINAL.zip

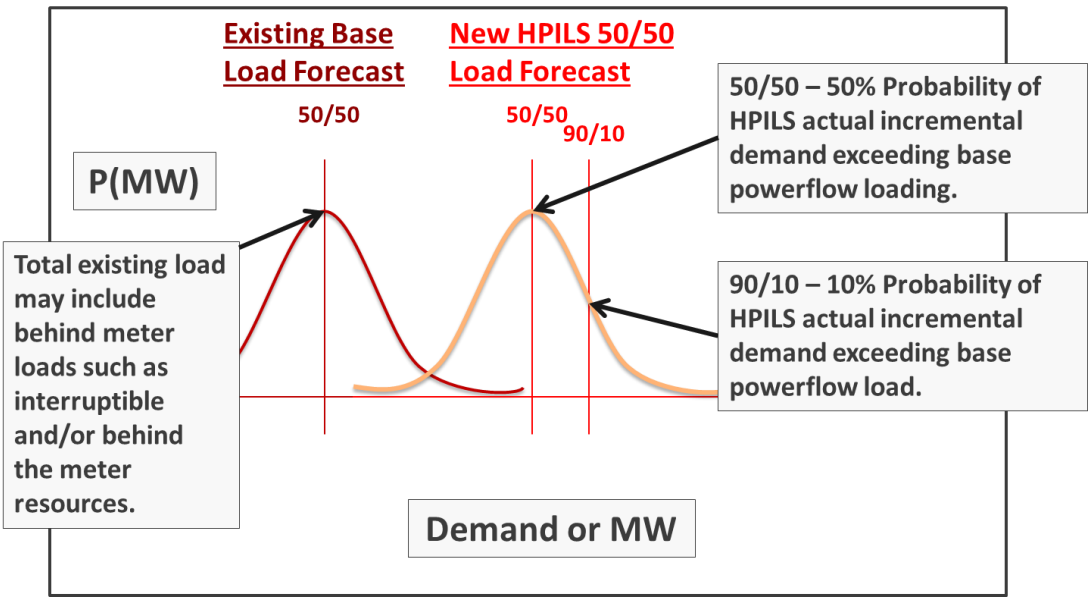


Figure 4.1: HPILS Load Forecast Probabilities

4.3 Resource Plan Development

Identifying the resource outlook is a key component of evaluating the transmission system for a long-term study horizon. Resources are added and retired frequently, and the SPP generation portfolio will not look the same in the future years as it looks today. Resource expansion plans were developed for the SPP region based on direct input from applicable stakeholders and by leveraging assumptions from the 2015 ITP10 resource plan. The resource plans include both renewable and conventional generation plans and are incremental for each study year.

4.3.1 Renewable Generation Assumptions

New wind generation was included as a part of the HPILS economic analysis. Reliability analysis included no additional wind assumptions. New wind assumptions were consistent with the 2015 ITP10 policy survey assumptions and implementation as of 12/04/2013.

The 2013 Policy Survey was used to gather information on members' state renewable Mandates, Goals, and Other[9] with which they expect to comply with by 2024. Additional wind generation was added to the system when the existing wind was not sufficient to meet state Mandates, Goals, and Other. The total additional wind added in the SPP footprint is 3.4 GW. The additional wind energy was allocated to the zones within SPP as needed to meet state renewable Mandates, Goals, and Other.

[9] As defined by the CAWG

Project	Owner	2019 Capacity (MW)	2024 Capacity (MW)
Kansas #1	WERE/BPU	125	125
Kansas #2	MIDW	3	26
Kansas #4	WERE	100	100
Kansas #8	KCPL	62	147
Missouri #5	KCPL/GMO	0	192
Missouri #6	KCPL/GMO	102	192
New Mexico #1	WFEC/COOP	97	132
New Mexico #4	SPS	250	250
Oklahoma #1	OGE	85	139
Oklahoma #5	OGE	95	157
Oklahoma #6	LES	100	100
Oklahoma #7	SPS	199	199
Oklahoma #9	WERE	200	200
Oklahoma #10	PSO/WFEC	300	300
Oklahoma #11	PSO	200	200
Oklahoma #12	PSO	199	199
Nebraska #2	OPPD	400	400
Nebraska #5	NPPD/GRIS	55	70
Texas #6	SPS	249	249
Solar #1	SPS	10	10
Solar #2	SPS	10	10
Total		**2842**	**3398**

Table 4.1: Additional Renewable Generation for HPILS Economic Analysis

Figure 4.2 and Figure 4.3 show the additional 2019 and 2024 renewable generation forecasts. Note that the 2019 and 2024 renewable generation forecasts were included in the 2018 and 2023 HPILS economic study models, respectively.

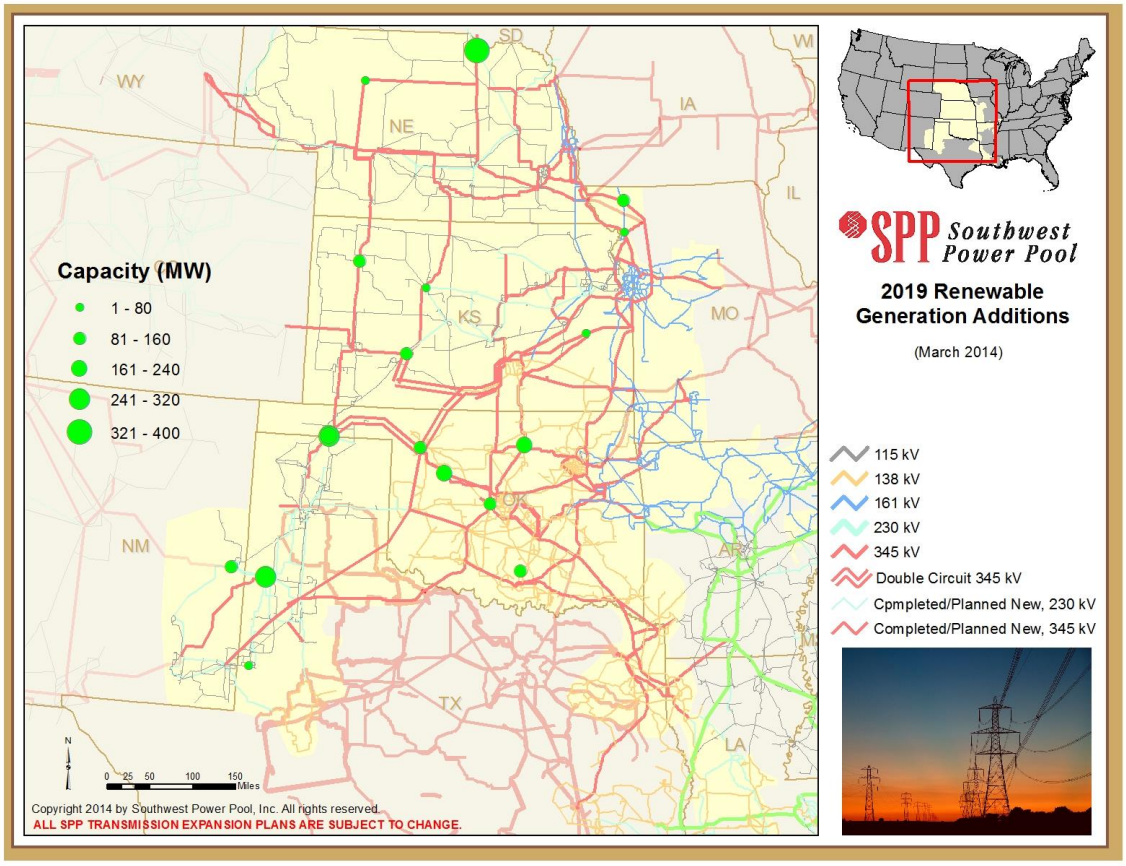


Figure 4.2: Location of Additional 2019 Renewable Generation

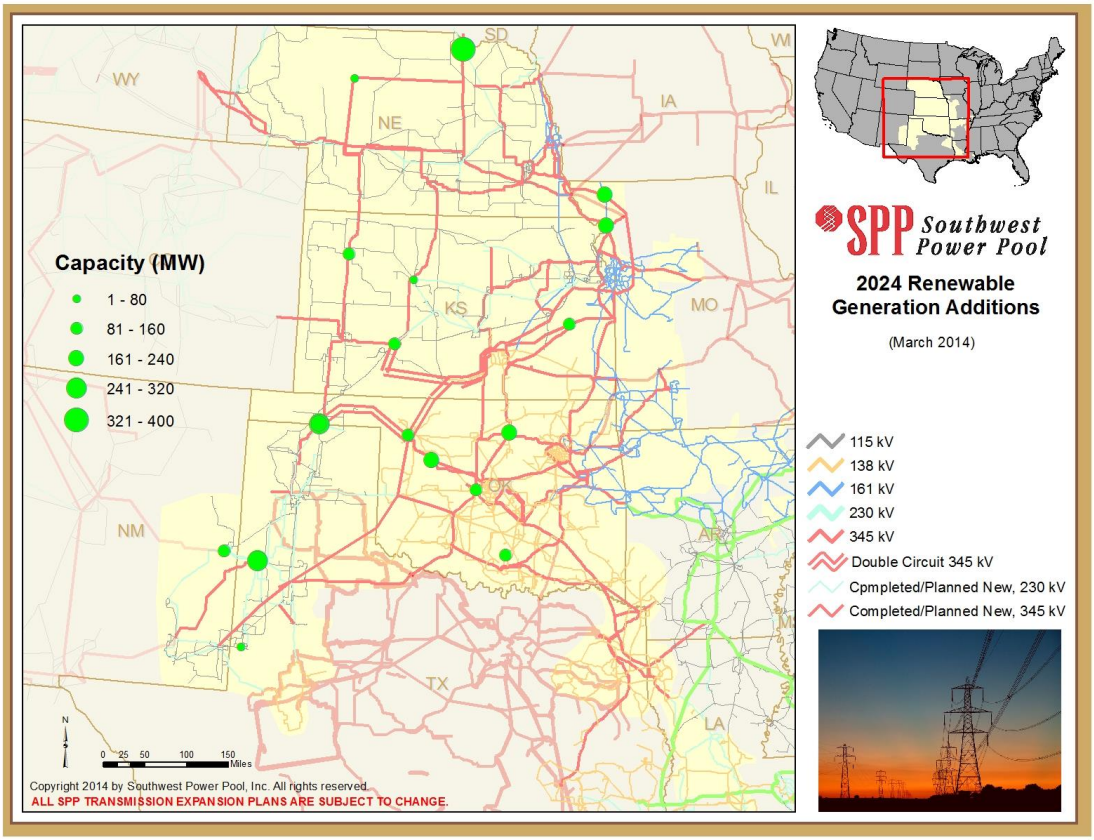


Figure 4.3: Location of Additional 2024 Renewable Generation

4.3.2 Resource Plan Summary

Conventional resource plans were developed by each stakeholder in order to meet the requirements of new demand. *Section 5.3 Generation Outlook* below provides the resource additions to meet the initial 50/50 and 90/10 demand projections.

5 Drivers

5.1 Stakeholder Driven Drivers

Drivers for the HPILS were discussed and developed through the stakeholder process in accordance with the HPILS Scope and involved stakeholders from several diverse groups. The load, generation, transmission, financial, and market design inputs were considered for their importance in determining the need for and design of transmission.

5.2 Load Outlook

Future electricity usage was collected from and forecast by the Stakeholders through the HPILS data collection process. Summer peak load forecasts for each of the study years were collected for the 50/50 and 90/10 load forecast probabilities.

The following sections summarize the total incremental load forecast submissions by area.

5.2.1 Total Incremental Load Changes

The total load changes from the original 2015 Summer (2014 ITPNT), 2018 Summer (RCAR)and 2023 Summer (RCAR) base models are shown in Figure 5.1 below.

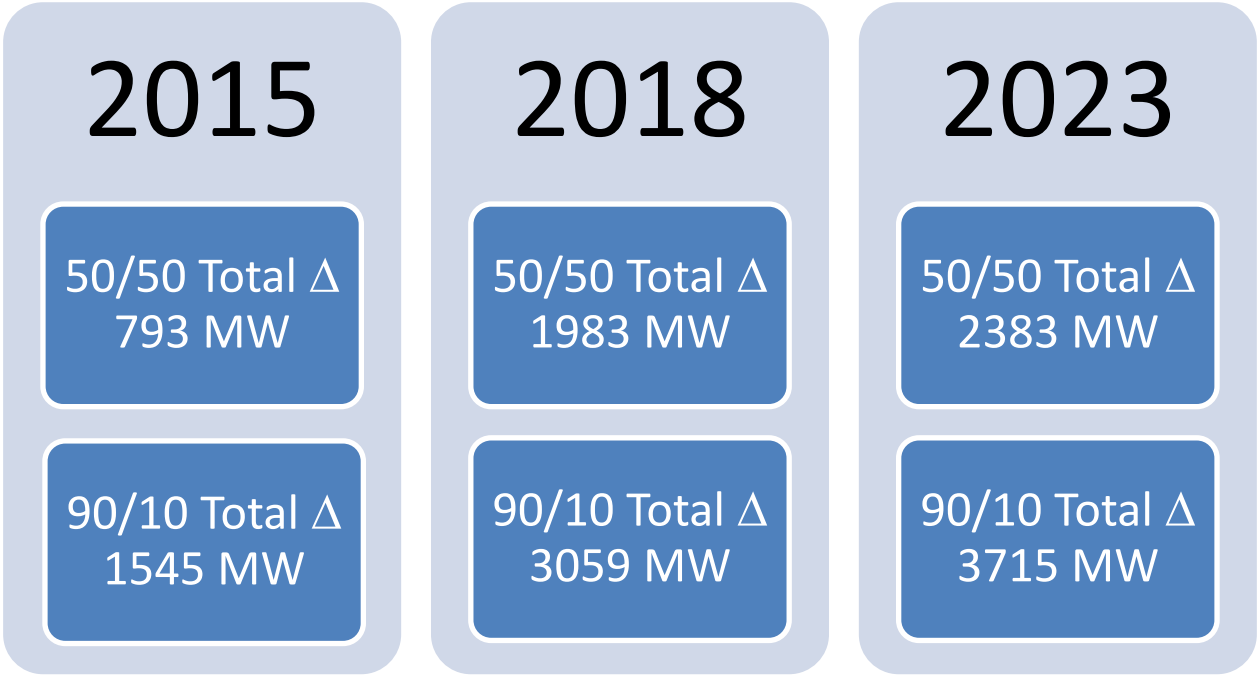


Figure 5.1: Total Incremental Change from Base Load Forecasts

5.2.2 Total Load Change by Area

The total load changes from the base 2015, 2018, and 2023 study models to the HPILS 2015, 2018, and 2023 50/50 and 90/10 study models for each planning area are shown in Figure 5.2 through Figure 5.4.

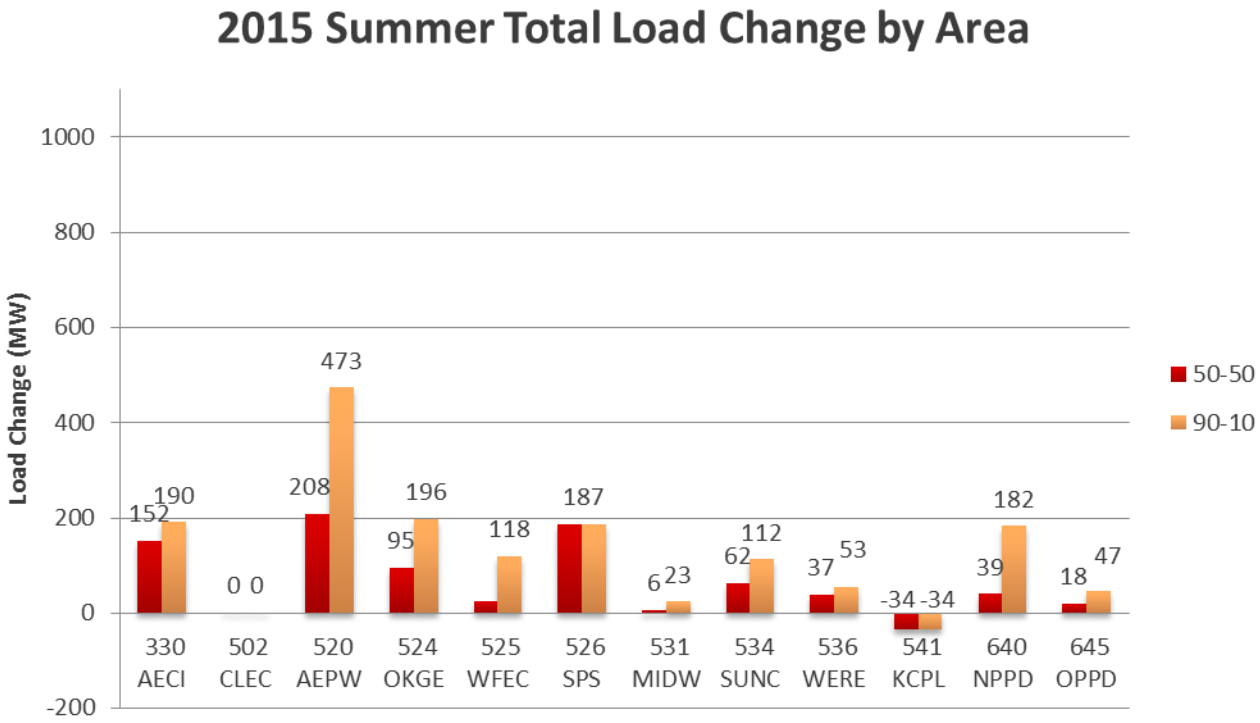


Figure 5.2: 2015 Total Incremental Load Change by Area

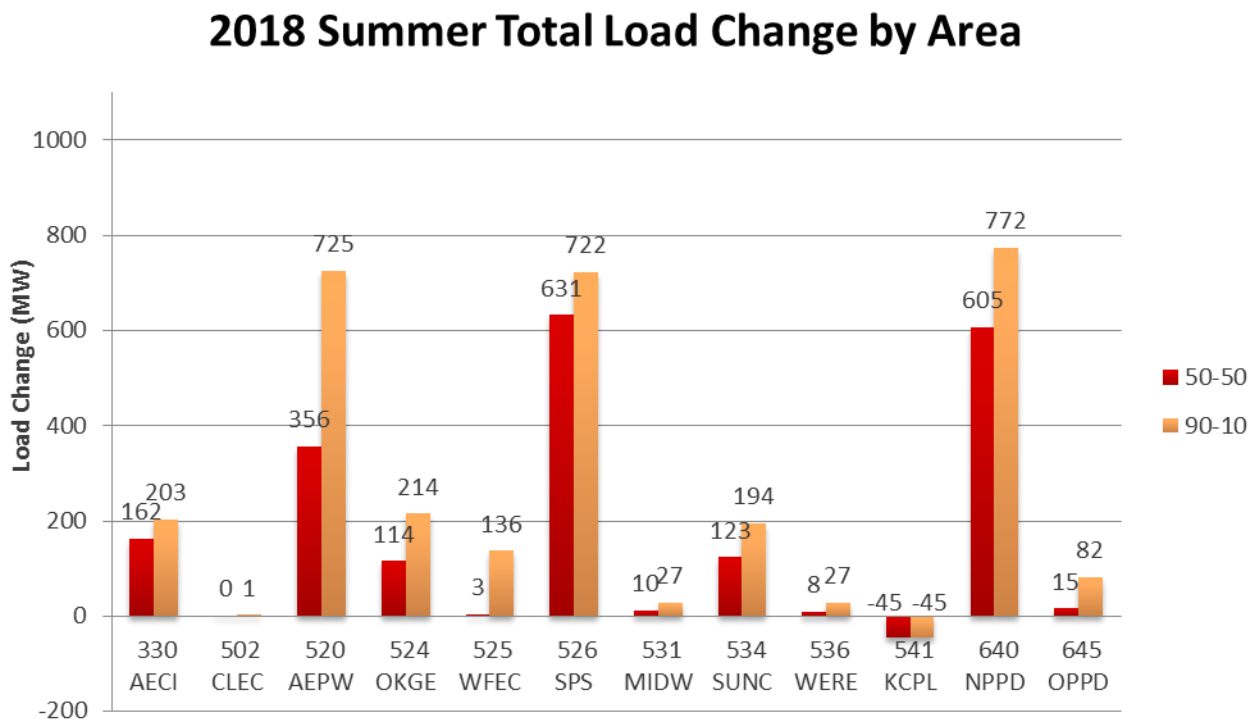


Figure 5.3: 2018 Total Incremental Load Change by Area

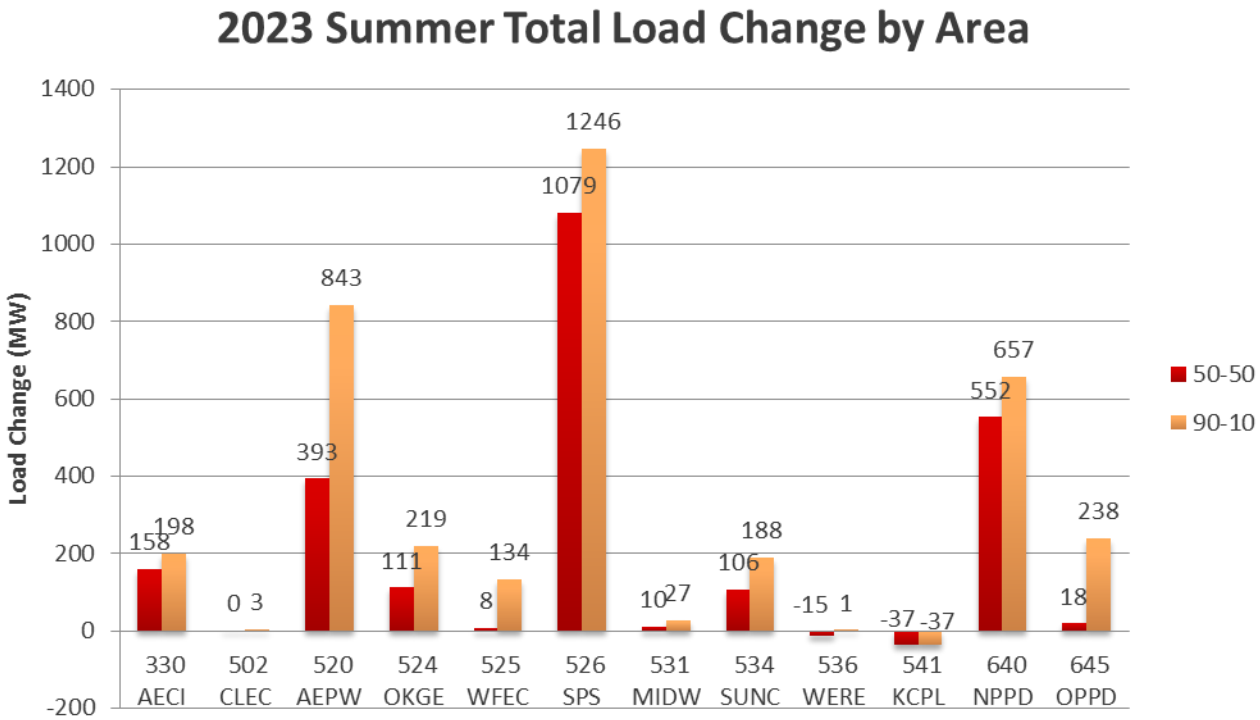


Figure 5.4: 2023 Total Incremental Load Change by Area

Figure 5.5 and Figure 5.6 below show the geographic locations of the 2023 50/50 and 90/10 loads included in the HPILS scenarios.

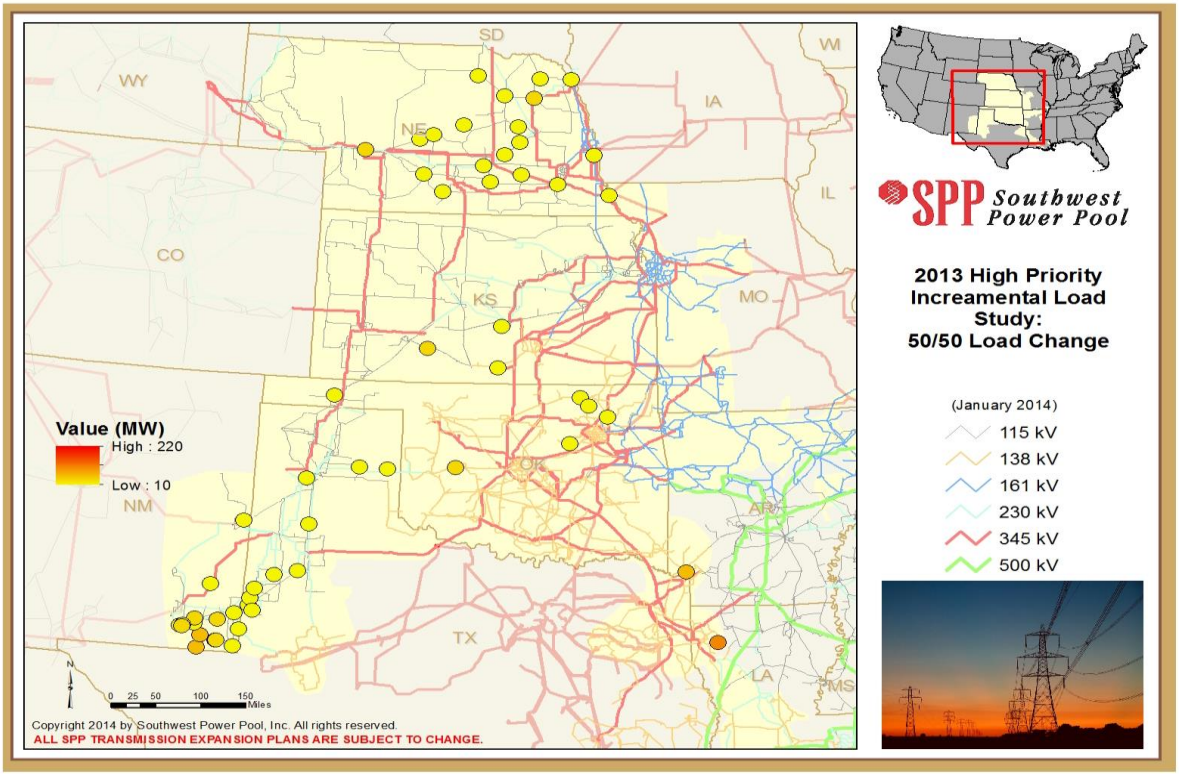


Figure 5.5: 2023 50/50 Load Geographic Locations

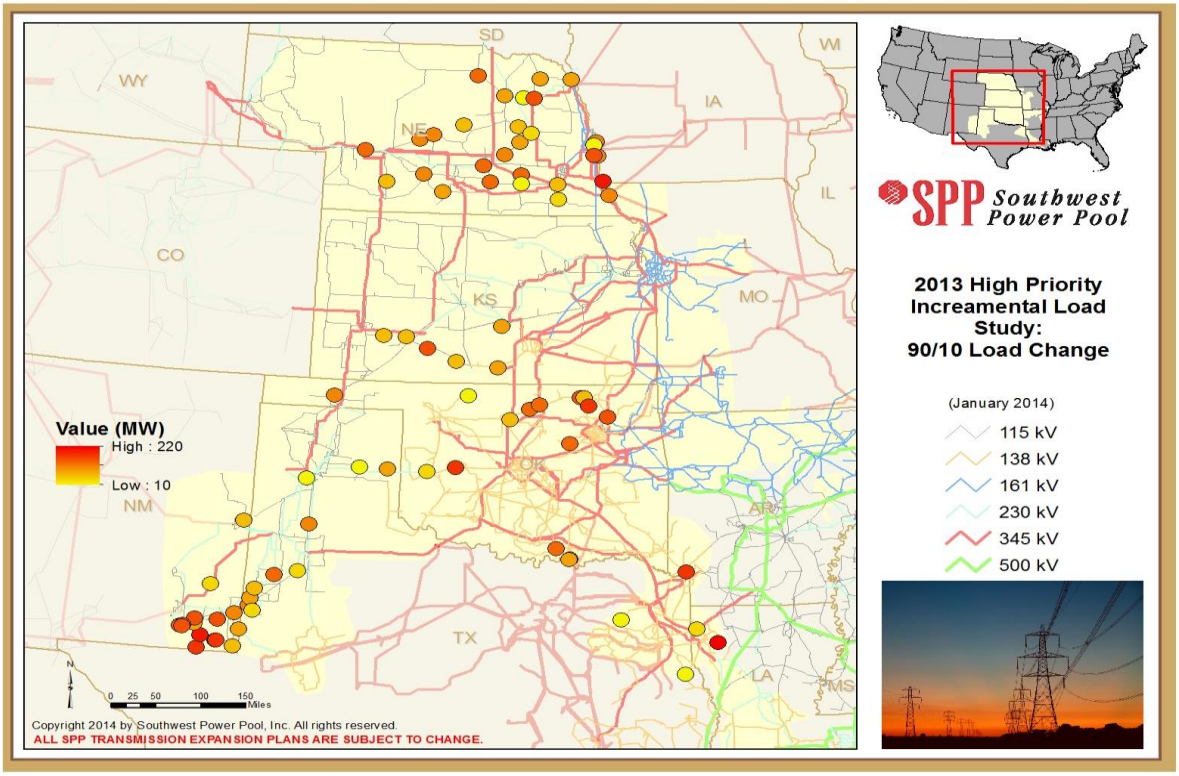


Figure 5.6: 2023 90/10 Load Geographic Locations

5.3 Generation Outlook

Future generation changes based on the load forecast submissions for the 50/50 and 90/10 load forecast probabilities were provided by the Stakeholders. Generation technologies for the incremental generating units represented within the SPP footprint included combustion turbine natural gas (CT), wind, and others. The generation changes include generation additions and retirements as described in the following sections.

5.3.1 Major Generation Additions

The major generation added to the base models in the 2015, 2018, and 2023 50/50 and 90/10 models are summarized in Table 5.1 below. The impact of these generation additions in HPILS is discussed in more detail in *Section 7.6 Generation Outlet and Load Facility Assessment.*

Area	Generator Name/Location	Capacity (MW)	2015 50/50	2015 90/10	2018 50/50	2018 90/10	2023 50/50	2023 90/10
SEPC	Rubart Generator	110	X	X	X	X	X	X
NPPD	Gas Turbine at Moore 345 kV	160			X	X	X	X
SPS	Antelope CT @ Tuco 345 kV	589			X	X	X	X
SPS	North Loving Generators (2 x280)	560			X	X	X	X
WFEC	Mooreland4 Unit @ Woodward 345 kV	300			X	X	X	X
OKGE	Seminole @ Seminole 345 kV	300					X	X
SPS	PX_Gen @ Plant X 230 kV	300					X	X
LP&L	Future Gen @ Holly 230 kV	700					X	X
OPPD	Cass Gen	160						X
	Total Additions (MW)	**3179**						

Table 5.1: Major HPILS Generation Additions

The specific dispatch of these generating units in the reliability models were not necessarily at the capacities shown in Table 5.1 above.

The major generation additions are illustrated in Figure 5.7 and Figure 5.8 below.

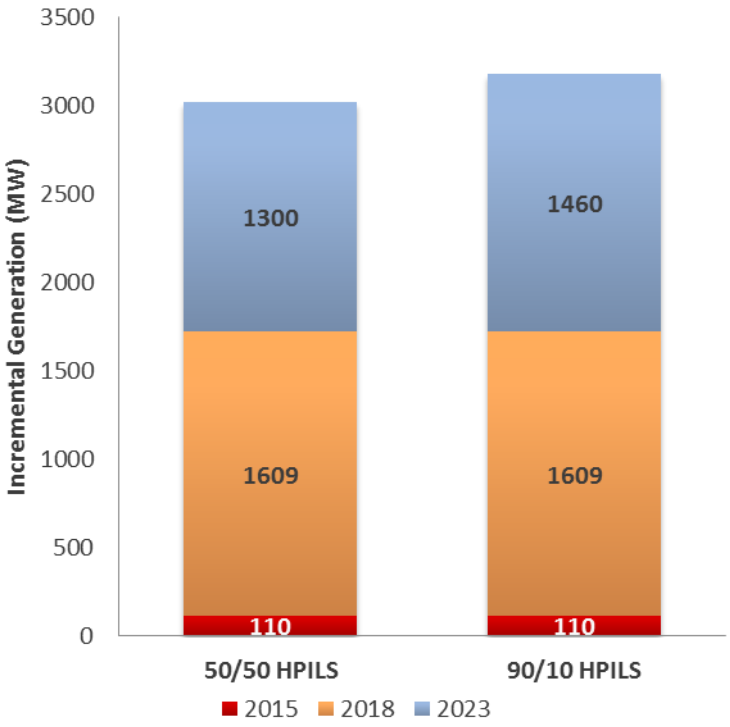


Figure 5.7: Major Incremental Generation Additions

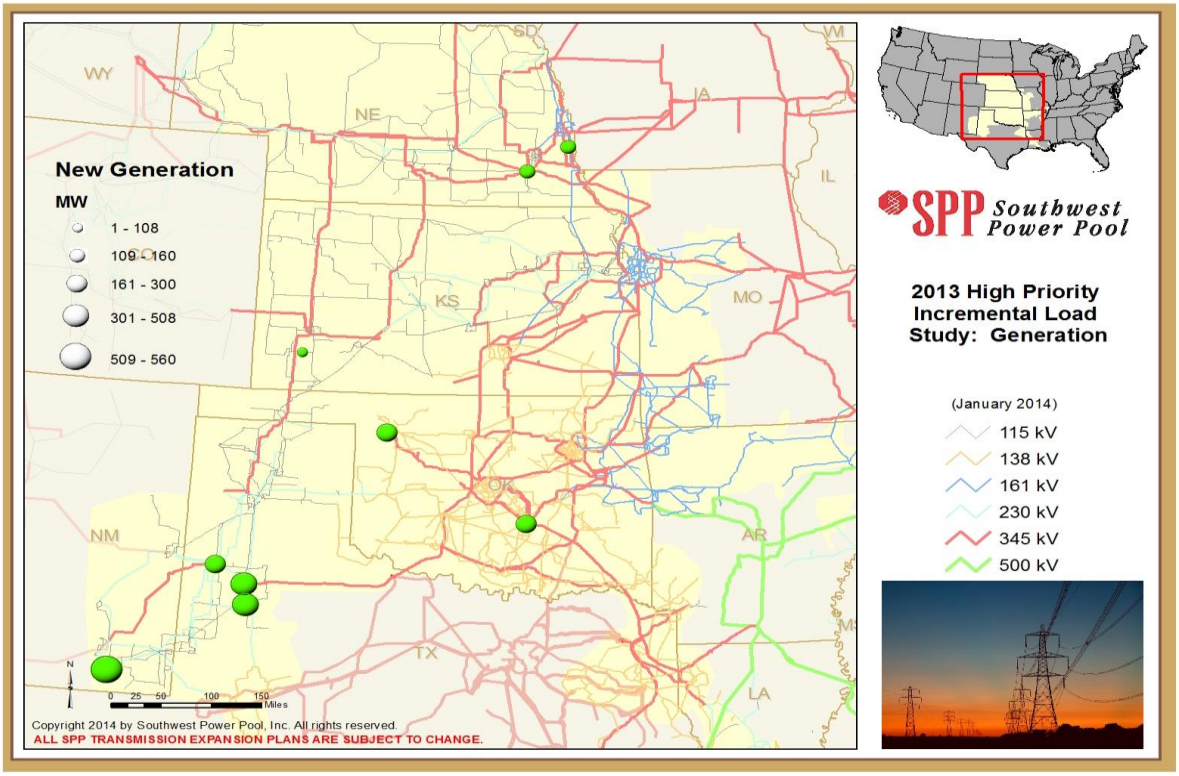


Figure 5.8: Generation Geographic Locations

5.3.2 HPILS Major Generation Retirements

There were no additional generation retirements applied to the 2015 and 2018 HPILS study models. However, there were a total of 339 MW of unit retirements in the 2023 horizon:

- SPS: Plant X I @ 38 MW
- SPS: Plant X II @ 91 MW
- SPS: Plant X III @ 93 MW
- SPS: Cunningham I @ 71 MW
- SPS: Moore Co @ 46 MW

5.3.3 Generator Operating Characteristics

Reasonable operating characteristics consistent with each unit type were utilized in the production cost models. Review of these characteristics was facilitated through the ESWG and TWG in previous ITP studies.

5.3.4 Transaction Changes

Additional export transactions from specific member areas were included to account for the addition loads served by those members in external areas. Table 5.2 shows the additional transaction changes made to the 2015, 2018, and 2023 base models. These changes are common to the 50/50 and 90/10 scenarios for the respective years.

Transfer From	Transfer To	2015 (MW)	2018 (MW)	2023 (MW)
AEPW	WFEC	160	250	280
WFEC	SPS	50	180	300

Table 5.2: Transaction Summary

5.4 Transmission Outlook

The 2015, 2018, and 2023 base models were updated to include SPP projects with approved NTCs known during the model development phase of the study. In addition to the approved NTCs, the Stakeholders provided the minimum transmission expansion required to connect the HPILS load and generation projections. These transmission expansions were only sufficient for ensuring that the base model could solve under system intact (Category A) conditions.

5.4.1 Projects with Confirmed NTC's

Projects with confirmed NTCs were included in the base transmission models. The planned expansions for areas outside of SPP were as represented in the 2015, 2018, and 2023 base models.

5.4.2 Transmission Needed for Load Connections

Transmission projects were built into the base models to connect the projected HPILS load. Some of these projects will be considered direct assignment or radial facilities or distribution facilities and will not receive NTCs. The list of projects included in the base models are provided in Appendix A.

5.4.3 Assessment of Suspended NTC-C Projects

The scope of the HPILS also included the reevaluation of three suspended NTC-Cs:

- Tuco – Amoco - Hobbs 345 kV Line
- Tuco - New Deal 345 kV Line
- Grassland – Wolfforth 230 kV Line

These three projects were excluded from all the HPILS 2015, 2018, and 2023 base models in order to determine the need for and/or the impact of the projects.

5.4.4 Removal of Sharyland Facilities

Sharyland transferred the CAPROCK 138kV loop and related loads from SPP to ERCOT on December 23, 2013. As a result, SPS has sold related transmission facilities to Sharyland with the transaction closing on those facilities on December 30, 2013. The following Sharyland Facilities were disconnected from the HPILS base models:

- Cirrus Wind to Borden Co 230 kV Line (345kV design)
- Line Section near NEF (future sub) to Midland Co 230 kV Line (345kV design)
- 138 kV between Midland Co and Borden Co

5.5 Financial Outlook

5.5.1 Nominal and Real Dollars

Unless specified otherwise, all dollar amounts reported are in nominal dollars. The dollar values utilized in the simulations represent the value of fuel prices and operating costs in their respective study year.

To account for effects of inflation upon the U.S. dollar, the values are presented in real terms by applying a rate of 2.5%.

5.5.2 Fuel Price Forecasts

Fuel price projections were modeled consistent with the assumptions used in the 2013 ITP20 study. The data is derived from the Ventyx Spring 2012 Reference Case and NYMEX futures.

The costs of each fuel were used as inputs in the market adjusted production cost (APC) simulations and contribute to the price per MWh of each generator. There were no fuel price sensitivities performed in this study.

5.5.3 Inflation, Carrying Charge, and Interest Rate Assumptions

An Annual Transmission Revenue Requirement (ATRR) utilized in the economic screening was calculated by multiplying the total investment estimate for each project, in nominal dollars, by the appropriate Net Plant Carrying Charge Rate (NPCC). The reductions in ATRR due to depreciation of the asset in the Rate Base were not considered in the initial project screenings but were considered in the calculation of the forty-year benefits and costs. In the case of the forty-year financial analysis the costs for each year were calculated using the formula for ATRR. This calculation used the applicable NPCC for projects. The NPCC for the host zone of a project was applied to the engineering and construction cost, or investment cost, of a project. For the calculation, the projects were fully depreciated over the 40 years of analysis. A 2.5% interest rate was utilized for all inflation. An 8 % discount rate was used for all discounting calculations.

5.6 Treatment of Energy Markets

The development of the Integrated Marketplace and the associated Consolidated Balancing Authority were accounted for in the HPILS economic analysis. Each of the current Balancing Authorities within the footprint were committed and dispatched collectively. Three of the major components of the Marketplace were accounted for in the study through the use of a security constrained economic dispatch that adhered to a unit commitment process: 1) a reliability unit commitment process, 2) a real-time balancing market, and 3) a consolidated balancing authority.

Within this study, any reference to the SPP footprint refers to the Regional Transmission Organization (RTO) Balancing Authorities and Transmission Owners[10] as defined by SPP membership. Energy markets were similarly modeled for other RTOs in the Eastern Interconnect. Notably, AECI operated as a stand-alone entity in order to reflect its current operating characteristics and commitments.

5.6.1 Integrated System RTO/ISO Membership

In 2013, the Integrated System of Basin Electric, Western Area Power Administration (WAPA), and Heartland Consumers Power District (collectively the Integrated System) announced its intention to join the SPP. The Integrated System's notice to join SPP was announced in the middle of the HPILS analysis. Therefore, the Integrated System was treated as a standalone entity within the MAPP Non-MISO external region.

5.6.2 External Regions

The external regions were modeled consistently across all of the cases analyzed to ensure that the benefits pertain only to changes in SPP's transmission expansion. The system footprint is based on what is used in the SPP ITP20 process, including the following regions:

- SPP
- MISO (including Entergy and CLECO)
- MAPP Non-MISO
- PJM
- SERC – Central Sub-region, Southeast Sub-region, AECI

5.6.3 Hurdle Rates

Additional tariff charges were assumed in the security constrained economic dispatch simulations. The values utilized varied from area to area but all tariff charges (or hurdle rates) between SPP and neighboring areas were kept consistent at $5 for the hourly dispatch rate and $8 for the day ahead commitment rate for flows into and out of the SPP footprint.

5.7 Software & Simulations

Various software packages were used to complete the HPILS, including ABB's PROMOD®, PTI's PSS®E, and PTI's PSS®MUST package. Throughout this report, reference to DC and economic simulations refer to runs completed using the PROMOD® software. References to AC simulations indicate usage of PPS®E. References to transfer analyses indicate usage of PSS®MUST.

[10] SPP.org > About > Fast Facts > Footprints

6 Analysis Methodology

6.1 Data Collection

Data collection was necessary for development of the reliability and economic study models. In order to assess the impact of expected load additions, e.g., oil and gas developments; a survey was conducted to gather the projected peak load per area for 2015, 2018, and 2023 and for the 50/50 and 90/10 load probabilities. Load Service Entities (LSE) were asked to submit the incremental load data, any transmission modifications required to connect the incremental load, and the associated PSS/E response file (.idv) with the transmission modifications. LSEs provided necessary incremental generation additions and/or capacity transactions which were needed to serve the incremental load identified in the load submission.

6.2 Reliability Model Development

6.2.1 Development of the Base AC Power Flow Models

The AC power flow models developed for the reliability analysis consisted of the 2015, 2018, and 2023 study years. Each of the reliability models in the study assumed individual Balancing Authorities (BA). The initial base cases for the 2015, 2018, and 2023 study years were:

- 2013 Series 2015 Summer ITPNT Scenario 0
- 2012 Series 2018 Summer RCAR
- 2012 Series 2023 Summer RCAR

For each of the study years, base load adjustments and incremental loads were modeled as provided by the stakeholders. The six models used in the HPILS reliability analysis are listed below:

- 2015 Summer Peak (50/50)
- 2015 Summer Peak (90/10)
- 2018 Summer Peak (50/50)
- 2018 Summer Peak (90/10)
- 2023 Summer Peak (50/50)
- 2023 Summer Peak (90/10)

The reliability models included the current topology and projects with approved NTC's. Additional topology was included to incorporate the interconnection of the incremental load where needed and as provided by the stakeholders. The existing generators modeled in the base cases were the initial starting point for resource needs. Additional conventional generation and/or capacity transactions were supplied by the stakeholders as needed to serve the adjusted base and incremental demand for each of the study years.

6.3 Economic Model Development

6.3.1 Development of the Base DC Economic Models

The DC economic models developed for the economic analysis consisted of the 2018 and 2023 study years. The initial base case for the 2018 and 2023 study years were the 2018 Summer RCAR and 2023 Summer RCAR models respectively. Adjustments were performed where appropriate in initializing each of the economic base cases. Similar to the reliability models, base load adjustments and

incremental load were modeled as provided by the stakeholders. Existing facilities, projects with approved NTC's, and additional build out necessary to support the interconnection of the incremental load were included in each of the study years, mirroring the topology change in the reliability study cases.

The same resource expansion to meet the increased demand that was modeled in the reliability models was included as well in the each of the economic models. Additional wind resources were added to the HPILS economic models consistent with the 2015 ITP10 survey results. Incremental demand profiles were provided by stakeholders. Likewise, energy profiles for each of the additional resources were provided by stakeholders.

6.3.2 Identification of Additional Constraints

The initial list of constraints was defined from the NERC Book of Flowgates for the SPP region. Each of the constraints defined in the NERC Book of Flowgates was revised as necessary to reflect the topology changes conducted in establishing the economic base case for the 2018 and 2023 study years. In addition to NERC Book of Flowgates list, more constraints were incorporated based on the initial reliability analysis for system intact and single element outage analysis. These additional constraints facilitated the capture of both market congestion and economic benefits in expectation of transmission that is not anticipated by the NERC book of Flowgates.

6.4 Reliability Needs Identification

6.4.1 Thermal and Voltage Assessment

The objective of the AC analysis was to identify 60+ kV upgrades needed to ensure the reliability of the system. The system intact assessment as well as single contingency analysis was performed for the following voltage levels:

- SPP 60 kV and above
- All other Tier 1 areas 100 kV and above

These facilities were monitored during the contingency analyses:

- SPP 60 kV and above
- All other first tier area 100 kV and above

Potential violations were determined by using the more restrictive of the NERC Planning Standards, SPP Criteria, or local planning criteria for system intact and single contingency conditions.

6.5 Reliability Project Development

Reliability projects that addressed reliability needs were developed from a pool of solutions that was derived from SPP transmission service studies, generation interconnection studies, previous ITP studies, local reliability planning studies by TOs, Attachment AQ studies, stakeholder input, and staff evaluation. Projects within this pool were considered as a possible solutions to evaluate in creating the HPILS Portfolio.

The development of the HPILS reliability projects began with the 2023 study scenarios. Once the 2023 projects were tested and selected, those projects were also selected for the 2018 and 2015 scenarios if the associated reliability needs were also identified in 2018 and 2015.

6.6 Reliability Project Staging

As discussed above, projects were developed for the 2023, 2018, and 2015 scenarios. For each of the projects in the 2023 and 2018 study years, a staging assessment was performed to identify if the 2023 projects were needed prior to the 2023 study year (i.e. in 2019, 2020, 2021 or 2022) and if the 2018 projects were needed prior to the 2018 study year (i.e. in 2016 or 2017). This staging was important in determining the start date required for each of the projects based on their lead time.

These need dates for each project was determined by evenly extrapolating the loading levels of constrained SPP facilities between the 2018 and 2023 study years for the 2023 projects and between the 2015 and 2018 study years for the 2018 projects. This calculation is described below:

- 2023 Staging: For each SPP facility loading over 95% of its rating in the 2018 50/50 model and overloaded (>100% of its rating) in the 2023 50/50 model, the 2019, 2020, 2021 and 2022 loading levels for that element were evenly extrapolated for each year.

- 2018 Staging: For each SPP facility loading over 95% of its rating in the 2015 50/50 model and overloaded (>100% of its rating) in the 2018 50/50 model, the 2016 and 2017 loading levels for that element were evenly extrapolated for each year.

If the loading levels in the intermediate years (2016, 2017, 2019, 2020, 2021 and 2022) exceeded 100% of the facility rating, the project identified in the respective 2023 and 2018 study years to resolve that constraint was flagged as needed in that particular year.

6.7 Economic Needs Identification

Congestion was assessed on an annual basis for 2018 and 2023 such that the analysis included variables that changed from day to day such as forced and maintenance outages of generating plants and those that changed on an hourly basis such as load curve shapes and wind output profiles. A total of 8,760 hours was evaluated for the study years. Significant congestion was identified through two values: the number of hours congested and the shadow price associated with the congestion in each hour. The shadow price was frequently aggregated for the whole year to a max, min, and average bi-directional value. The top constraints in the region as measured through hours congested and average shadow price were identified and prioritized with which constraint provided opportunity for APC savings. In this manner, the areas of greatest opportunity for economic projects were identified before stakeholder suggested projects were taken into consideration.

6.8 Economic Project Development

Economic projects were proffered by SPP staff and stakeholders based on the needs identified from the 2018 and 2023 models and were tested to determine the most cost-effective set of projects. The solution set was not limited to 345 kV and higher voltage facilities. Needs that warrant lower voltage solutions were also addressed as directed by the HPILS Task Force. The assessment is discussed further in *Section 8.2 Economic Needs Assessment*.

6.9 Final Portfolio Assessment and Benefit Metric Calculations

6.9.1 Measuring Economic Value

Once the best economic project was determined through the process determined above, a 40-year financial analysis of that project's costs and benefits were developed for the 50/50 load case. Benefits considered in that analysis included APC savings. Benefit impact calculations were made on a Regional, Zonal, and State basis. State values will be extrapolated from the zonal costs and benefits. The development of these costs and benefits will be done under direction of the HPILS Task Force.

6.9.2 Calculation of Adjusted Production Cost

APC is a measure of the impact on production cost savings by Locational Marginal Price (LMP), accounting for purchases and sales of energy between each area of the transmission grid. APC is determined from using a production cost modeling tool that accounts for hourly commitment and dispatch profiles for one simulation year. The calculation, performed on an hourly basis, is as follows:

$$Revenue\ from\ Sales = MW\ Exported\ x\ Zonal\ LMP_{Gen\ Weighted}$$

$$Cost\ of\ Purchases = MW\ Imported\ x\ Zonal\ LMP_{Load\ Weighted}$$

APC captures the monetary cost associated with fuel prices, run times, grid congestion, ramp rates, energy purchases, energy sales, and other factors that directly relate to energy production by generating resources in the SPP footprint.

6.10 Final Reliability Assessment

A final contingency analysis was performed with the reliability solutions identified to ensure the projects did not adversely affect the transmission system. There were no economic-only projects included in the final reliability analysis.

PART II: STUDY FINDINGS

7 Reliability Assessment

The findings of the reliability assessment are presented here. It includes thermal limit overloads and voltage limit violations that drove the need for each of the projects in the HPILS Portfolio. These observations and suggested mitigations form the basis of the final portfolio.

The projects in the portfolio were studied through an iterative process to reduce the scale of the transmission development. The assessment utilized a diverse array of power system and economic analysis tools to evaluate the need for 100 kV and above facility projects that satisfies the reliability needs.

The timing of the reinforcements identified in each of the 2015, 2018, and 2023 study years was determined through an iterative process that included numerous combinations of developments required to meet the reliability needs under system intact and N-1 contingency conditions. Several iterations of the analyses were performed to reduce the scale of the transmission development and determine the most cost effective solution.

The projects were developed through an evaluation of alternative solutions and systematic review and input from the stakeholders. The projects resulting from this rigorous process are summarized in the following sections.

7.1 System Needs

Reliability needs were identified to satisfy the NERC Reliability Standards, SPP Reliability Criteria and local planning criteria for system intact and N-1 contingency conditions. Individual projects were targeted to meet the various reliability needs outlined in the sections that follow. The needs identified for the SPP footprint fell into these six states: Kansas, Louisiana, Nebraska, New Mexico, Oklahoma, and Texas.

The following section provides the findings of the reliability assessment. The projects required for the 2015, 2018, and 2023 study years and the 50/50 and 90/10 load forecasts for each year are presented in the following sections.

7.2 2015 Reliability Assessment

The following describes the major[11] projects driven by reliability needs identified in the 2015 assessment by geographical area. Note that only major upgrades needed for the 50/50 load forecast are discussed specifically, but a full list of projects is provided in Table 7.1.

7.2.1 West Texas/New Mexico

Due to the load growth in the New Mexico area, several issues were identified. Because rapid load growth is expected but 345kV sources cannot be provided in the near future, some project would need to be designed for 345 kV but operated at 230 kV projects initially. Building to 345 kV design provides additional capacity that will be needed as the load in the area continues to grow.

[11] 100 kV and above, excludes terminal upgrades and capacitor banks

Potash Junction to Road Runner 230 kV Line and Road Runner 230/115 kV Transformer

This new Potash Junction to Road Runner 230 kV line and Road Runner 230/115 kV transformer addressed 115 kV voltage issues observed around Potash Junction due to the outage of Potash Junction to Intrepid West Tap 115 kV line. The Potash Junction to Road Runner line will initially be operated at 230 kV but should be designed for future 345 kV operation.

South Loving 115 kV line and Substation

The 69 kV load located at South Loving was moved to this new 115 kV substation located between Hopi and North Loving. The load conversion addressed the overloads of the Carlsbad 115/69 kV transformers. The outage of one 115/69 kV transformer caused the other transformer to become overloaded.

Andrews to National Enrichment Facility (NEF) 115 kV line and Andrews 230/115 kV Transformer

This new 115 kV line from Andrews to NEF and the Andrews 230/115 kV transformer addressed overloads of the 115 kV path from Monument Tap to Byrd continuing towards S Jal due to the outage of Hobbs West Switching Station to Drinkard Tap 115 kV line.

Mustang to Shell CO2 115 kV Line

This new Mustang to Shell CO2 115 kV line addressed the overloads observed on the parallel Denver to Mustang 115 kV lines. The outage of one of the Denver to Mustang 115 kV line caused the other Denver to Mustang line to become overloaded.

7.2.2 Oklahoma

Several issues were identified for this area, including the area west of Oklahoma City and the transmission network north of Oklahoma close to the Kansas border.

Darlington – Roman Nose 138 kV line and Jenson Substation Upgrade

This new Darlington to Roman Nose 138 kV line provided an additional source into the area and alleviated the overload observed on the Elk City to Clinton 138 kV line. The new load at the future Darlington substation will be served off the existing 138 kV line between Hinton and Can Gas. Upon the outage of the Can Gas to Jenson 138 kV line the western 138 kV feed from Elk City to Clinton overloaded. The Jenson substation CT upgrade is required to remove the limitation of the Jenson 138 kV line towards Can Gas which ultimately serves the new Darlington Road load. The outage of the Weatherford 138 kV lines to Hydro or Sickle caused the loading on the line to exceed the CT limit at the Jenson substation. Increasing the CT limit at that substation will alleviate the loading violation.

Table 7.1 shows the list of projects identified for the 2015 50/50 load forecast.

State(s)	Upgrade Name	Issue NTC	50/50 Need Year
KS	Kansas Avenue - Dobson - Gano 115 kV Ckt 1 Terminal Upgrades	Yes	2015
KS	Garden City - Kansas Avenue 115 kV Ckt 1 Terminal Upgrades	Yes	2015
NE	Spalding 115 kV Cap Bank	Yes	2015
NM	Eagle Creek 115 kV Cap Bank	Yes	2015
NM	Potash Junction 230/115 kV Ckt 1	Yes	2015
NM	Andrews 230/115 kV Ckt 1 Transformer	Yes	2015
NM	Potash Junction - Road Runner 230 kV Ckt 1	NTC-C Modify	2015
NM	Road Runner 230/115 kV Substation	NTC-C Modify	2015
NM	North Loving - South Loving 115 kV Ckt 1	No	2015
OK	Darlington - Roman Nose 138 kV Ckt 1	Yes	2015
OK	Alva OGE 69 kV Terminal Upgrades	Yes	2015
OK	Jenson - Jenson Tap 138 kV Ckt 1 Terminal Upgrades	Yes	2015
OK	Freedom 69 kV Cap Bank	Yes	2015
OK	Carmen - Eagle Chief 69 kV Ckt 1 Reconductor	Yes	2015
OK	Eagle Chief 69 kV Cap Bank	Yes	2015
TX	Mustang - Shell CO2 115 kV Ckt 1	Yes	2015

Table 7.1: Reliability Projects Needed by 2015 for 50/50 Load Forecast

7.2.3 2015 90/10 Incremental Reliability Projects

In addition to the reliability projects identified as being needed for the 2015 50/50 HPILS load forecast, the following additional projects were identified for the 2015 90/10 HPILS load forecast.

State(s)	Upgrade Name	Issue NTC	90/10 Need Year
KS	Anthony - Harper 138 kV Ckt 1	Yes*	2015
KS	Sun South 115 kV Cap Bank	No	2015
NE	Broken Bow 115 kV Cap Bank	No	2015
OK	Winchester 69 kV Cap Bank	No	2015
OK	Bufbear 138 kV Sub Conversion	No	2015
OK	Buffalo 138/69 kV Ckt 1 Transformer	No	2015
OK	Bufbear - Ft. Supply 138 kV Ckt 1 Rebuild	No	2015
OK	Bufbear - Buffalo 138 kV Ckt 1 Rebuild	No	2015
OK	Sandridge 138 kV Cap Bank	No	2015
OK	Little River - Maud Tap 69 kV Ckt 1 Reconductor	No	2015
OK	Winchester Tap 69 kV Cap Bank	No	2015
OK	Bartlesville Commanche - Mound Road 138 kV Ckt 1 Rebuild	No	2015
TX	Lone Star South - Wilkes 138 kV Ckt 1 Terminal Upgrades	No	2015
TX	Cochran 115 kV Cap Bank	No	2015

*This NTC was based on the project's 2018 50/50 and corresponding lead time, See Table 7.3 below

Table 7.2: Incremental Reliability Projects Needed by 2015 for 90/10 Load Forecast

7.3 2018 Reliability Assessment

The following describes the major projects driven by reliability needs identified in the 2018 assessment by geographical area. Note that only major upgrades[12] needed for the 50/50 load forecast are discussed specifically but a full list of projects is provided in Table 7.3.

7.3.1 West Texas/New Mexico

The following major projects were identified in West Texas/New Mexico for the 2018 study years.

Artesia 115/69 kV transformers

Artesia 115/69 kV transformers 1 and 2 need to be upgraded to a rating of 84 MVA in order to support the load growth. The outage of either transformer resulted in the other transformer becoming overloaded.

[12] 100 kV and above, excludes terminal upgrades and capacitor banks

Kiowa 345 kV Substation, Kiowa – Hobbs 345 kV line and Hobbs 345/230 kV transformer

The 345/230 kV transformer at Hobbs and Kiowa to Hobbs 345 kV line are needed to facilitate the transfer of generation located around Hobbs to support the load growth located in New Mexico and around the existing Potash Junction due to extreme low voltage conditions under both normal and contingency events The new Kiowa 345 kV substation is needed because of the limited space in the existing Potash Junction substation.

Hereford 115/69 kV transformer

Hereford 115/69 kV transformers 1 and 2 need to be upgraded to a rating of 84 MVA in order to support the load growth. The outage of either transformer resulted in the other transformer becoming overloaded.

Hale County to Tuco 115 kV line Reconductor

This line was overloaded due to the outage of Swisher to Tuco 230 kV line. This project addressed the overload by reconductoring the line.

7.3.2 Kansas

The following major incremental projects were identified in Kansas for the 2018 study years.

Clark Tap – Ashland – Coldwater Tap 115 kV line

This new line addressed voltage issues observed between Shooting Star Tap and Medicine Lodge 115 kV due to the loss of the 138 kV source from Medicine Lodge to Flat Ridge.

Anthony – Harper 138 kV line

This new line addressed voltage issues observed at Milan due to the outage of the Clearwater to Milan Tap 138 kV line.

7.3.3 Nebraska

The following major projects were identified in Nebraska for the 2018 study years.

Thedford 345/115 kV Transformer

This new 345/115 kV transformer addressed overloads on the 115 kV line from St. Francis to Mission due to the outage of O'Neil to Emmet Tap 115 kV line. The new Thedford 345/115 kV transformer also addressed numerous 115 kV voltage violations following the outage of either Maxwell – Stapleton 115 kV or O'Neill – Spencer 115 kV.

7.3.4 Oklahoma

The following major projects were identified in Oklahoma for the 2018 study years.

Cherokee Junction Tap 138/69 kV Development

This project addressed the overload on Carmen to Eagle Chief 69 kV line and Alva to Cherokee 69 kV line. This development also addressed the voltage issues near Cherokee and Hazelton 69 kV. The development includes the addition of a 138/69 kV transformer at Carmen and at Cherokee Junction Tap. The 69 kV line from Cherokee Junction to Carmen will be torn down and a new 138 kV line from Cherokee Junction Tap to Carmen would be built as part of this development.

Elk City 138/69 kV Transformer

The loss of the Elk City 138/69 kV transformer caused voltage issues on the 69 kV system between Elk City and Russell. The addition of a second 138/69 kV transformer at Elk City addressed this voltage issue.

Warwick Tap – SW Station – Linwood – Knipe 138 kV line

This new line addressed voltage issues observed in the Cushing area near the future Arco and Seaways load.

Fort Supply – Bufbear – Buffalo 69 kV to 138 kV Conversion

Due to the projected load growth around Winchester, the Fort Supply to Bufbear to Buffalo 69 kV lines were converted to 138 kV to address the voltage collapse due to loss of one of the 69 kV sources to Alva. The development includes the addition of a 138/69 kV transformer at Buffalo, a 12 MVAr capacitor bank at Winchester 69 kV, and rebuilding the 69 kV lines from Fort Supply to Bufbear to Buffalo with 138 kV conductors. Table 7.3 shows the list of projects identified for the 2018 50/50 load forecast including projects needed by 2016 and 2017.

State(s)	Upgrade Name	Issue NTC	50/50 Need Year
KS	Ashland - Coldwater Tap 115 kV Ckt 1	Yes	2018
KS	Ashland - Clark Tap 115 kV Ckt 1	Yes	2018
KS	Anthony - Harper 138 kV Ckt 1	Yes	2018
KS	Sun South 115 kV Cap Bank	No	2018
KS	Rock Creek 69 kV Cap Bank	No	2018
KS	Caney 69 kV Cap Bank	No	2018
KS	Coleman - Ripley 69 kV Rebuild Ckt 1	No	2018
NE	Thedford 345/115 kV Transformer	Yes	2016
NE	Thedford 345 kV Terminal Upgrades	Yes	2016
NE	Ainsworth 115 kV Cap Bank	No	2018
NM	Hobbs - Kiowa 345 kV Ckt 1	Yes	2018
NM	Andrews - NEF 115 kV Ckt 1	Yes	2015
NM	Hobbs 345/230 kV Transformer Ckt 1	NTC-C Modify	2018
NM	Artesia 115/69 kV Ckt 1 Transformer	No	2018
NM	Artesia 115/69 kV Ckt 2 Transformer	No	2018
OK	Carmen 138 kV Ckt 1Terminal Upgrades	Yes	2016
OK	Carmen 138/69 kV Ckt 1 Transformer	Yes	2016
OK	Cherokee Junction Tap 138/69 kV Ckt 1 Transformer	Yes	2016
OK	Carmen - Cherokee Junction 69 kV Ckt 1 Rebuild	Yes	2016
OK	Cherokee Junction Tap 138 kV Substation	Yes	2016
OK	SW Station - Warwick Tap 138 kV Ckt 1	Yes	2018
OK	Linwood - SW Station 138 kV Ckt 1	Yes	2018
OK	Knipe - SW Station 138 kV Ckt 1	Yes	2018
OK	Elk City 138/69 kV Ckt 1 Transformer	No*	2017
OK	Elk City 138 kV Ckt 1 Terminal Upgrades	No*	2017
OK	El Reno 138 kV Cap Bank	No	2018
OK	Winchester 69 kV Cap Bank	No	2018
OK	Bufbear 138 kV Sub Conversion	No	2018
OK	Buffalo 138/69 kV Ckt 1 Transformer	No	2018
OK	Bufbear - Ft. Supply 138 kV Ckt 1 Rebuild	No	2018
OK	Bufbear - Buffalo 138 kV Ckt 1 Rebuild	No	2018
OK	Alva OGE - Alva WFEC 69 kV Ckt 1 Reconductor (WFEC)	No	2018
OK	Alva OGE - Alva WFEC 69 kV Ckt 1 Reconductor (OGE)	No	2018
TX	Hereford 115/69 kV Ckt 1 Transformer	No	2018
TX	Hereford 115/69 kV Ckt 2 Transformer	No	2018
TX	Hale County - Tuco 115 kV Ckt 1 Reconductor	No	2018
TX	Kiser 115 kV Cap Banks	No	2018

* An alternate solution for this project will be evaluated through the ITP10/ITPNT process.

Table 7.3: Reliability Projects Needed by 2018 for 50/50 Load Forecast

7.3.5 2018 90/10 Incremental Reliability Projects

In addition to the reliability projects identified as being needed for the 2018 50/50 HPILS load forecast, the following additional projects were identified for the 2018 90/10 HPILS load forecast.

State(s)	Upgrade Name	Issue NTC	90/10 Need Year
KS	Cowskin - Goddtap 69 kV Terminal Upgrades	No	2018
KS	Minneola 115 kV Cap Bank	No	2018
KS	Barber - Medicine Lodge 138 kV Ckt 1	No	2018
KS	Barber 138/115 kV Ckt 1 Transformer	No	2018
KS	Clearwater - Milan Tap 138 kV Rebuild (WR)	No	2018
KS	Clearwater - Milan Tap 138 kV Ckt 1 Rebuild (MKEC)	No	2018
LA	Benteler - McDade 345 kV Ckt 1	No	2018
LA	McDade 345/138 kV Ckt 1 Transformer	No	2018
LA	Messick 500/345 kV Ckt 1 Transformer	No	2018
LA	McDade - Messick 345 kV Ckt 1	No	2018
LA	Benteler 345/138 kV Ckt 1 Transformer	No	2018
NE	Emmet Tap 115 kV Cap Bank	No	2018
NE	Humboldt 161/69 kV Ckt 1 Transformer	No	2018
OK	Clyde - Four Corners 138 kV Ckt 1 Reconductor	No	2018
OK	Four Corners - Kremlin 138 kV Ckt 1 Reconductor	No	2018
OK	Brady 69 kV Cap Bank	No	2018
OK	Kinzie - 19th Street 138 kV Ckt 1 Terminal Upgrades	No	2018
OK	Northeast Station - Watova 138 kV Ckt 1 Terminal Upgrade	No	2018
TX	Big Sandy - Perdue 69 kV Ckt 1 Rebuild	No	2018

Table 7.4: Incremental Reliability Projects Needed by 2018 for 90/10 Load Forecast

7.4 2023 Reliability Assessment

The following describes the major projects driven by reliability needs identified in the 2023 assessment by geographical area. Note that only major upgrades[13] needed for the 50/50 load forecast are discussed specifically but a full list of projects is provided in Table 7.6.

7.4.1 West Texas/New Mexico

With the increased load forecast in the 2023 study year, additional reinforcements were needed to import additional generation from West Texas into the New Mexico load pockets. Three viable reliability solution options were developed to alleviate loading violations on the underlying 115 kV and 230 kV network and also the voltage violations due to insufficient power supply to the load pockets.

[13] 100 kV and above, excludes terminal upgrades and capacitor banks

The three reliability solution options are:

1. Yoakum – Hobbs 345 kV line and associated projects (YH)
2. Tuco – Yoakum – Hobbs 345 kV line and associated transformers (TYH)
3. Tuco – Amoco – Hobbs 345 kV line and associated transformers (TAH)

TAH is one of the three suspended NTC-C projects which were reevaluated in the HPILS. The results confirm the need for additional reinforcement into the West Texas/New Mexico area but all three options met the reliability requirements outlined for HPILS. The individual projects unique to the YH, TYH and TAH solutions are listed in Table 7.5. Note that NTCs will be recommended to be issued for only the projects associated with the selected option (YH, TYH and TAH) not all the projects in Table 7.5.

Upgrade Name	Estimated Costs	Issue NTC	TAH	TYH	YH
Amoco 345/230 kV Transformer Ckt 1	$21,629,389	NTC-C	X		
Tuco - Amoco 345 kV Ckt 1	$88,198,879	NTC-C	X		
Amoco - Hobbs 345 kV Ckt 1	$137,452,487	NTC-C	X		
Yoakum 345/230 kV Ckt 1 Transformer	$4,929,607	NTC-C		X	X
Yoakum - Hobbs 345 kV Ckt 1	$69,907,711	NTC-C		X	X
Tuco - Yoakum 345 kV Ckt 1	$160,991,967	NTC-C		X	
Tuco 230/115 kV Ckt 1 Transformer	$6,020,434	No	X	X	
Tuco 230/115 kV Ckt 3 Transformer	$6,020,434	No			X
Tuco 345/230 kV Ckt 3 Transformer	$10,516,124	No			X
Amoco - Sundown 230 kV Ckt 1 Reconductor	$4,732,597	No			X
Terry County - Wolfforth 115 kV Ckt 1 Reconductor	$9,438,433	No			X
Jones - Lubbock South 230 kV Ckt 3	$4,980,233	No			X

Table 7.5: 2023 West Texas/New Mexico Developments

The YH solution has fewer 345 kV lines but requires additional reinforcements on the 230 kV and 115 kV networks. TYH and TAH are essentially the same projects with the exception of the Yoakum and Amoco connection differences. The economic benefits of the three options are examined in more detail in *Section 8.1 Evaluation of West Texas/New Mexico Reliability Alternatives.*

Figure 7.1, Figure 7.2, Figure 7.3 illustrate the individual developments included in the YH, TYH and TAH solutions respectively. The need dates for the developments shown on the diagrams are based on the reliability assessment. Note that the lead times for the projects are not reflected in these diagrams.

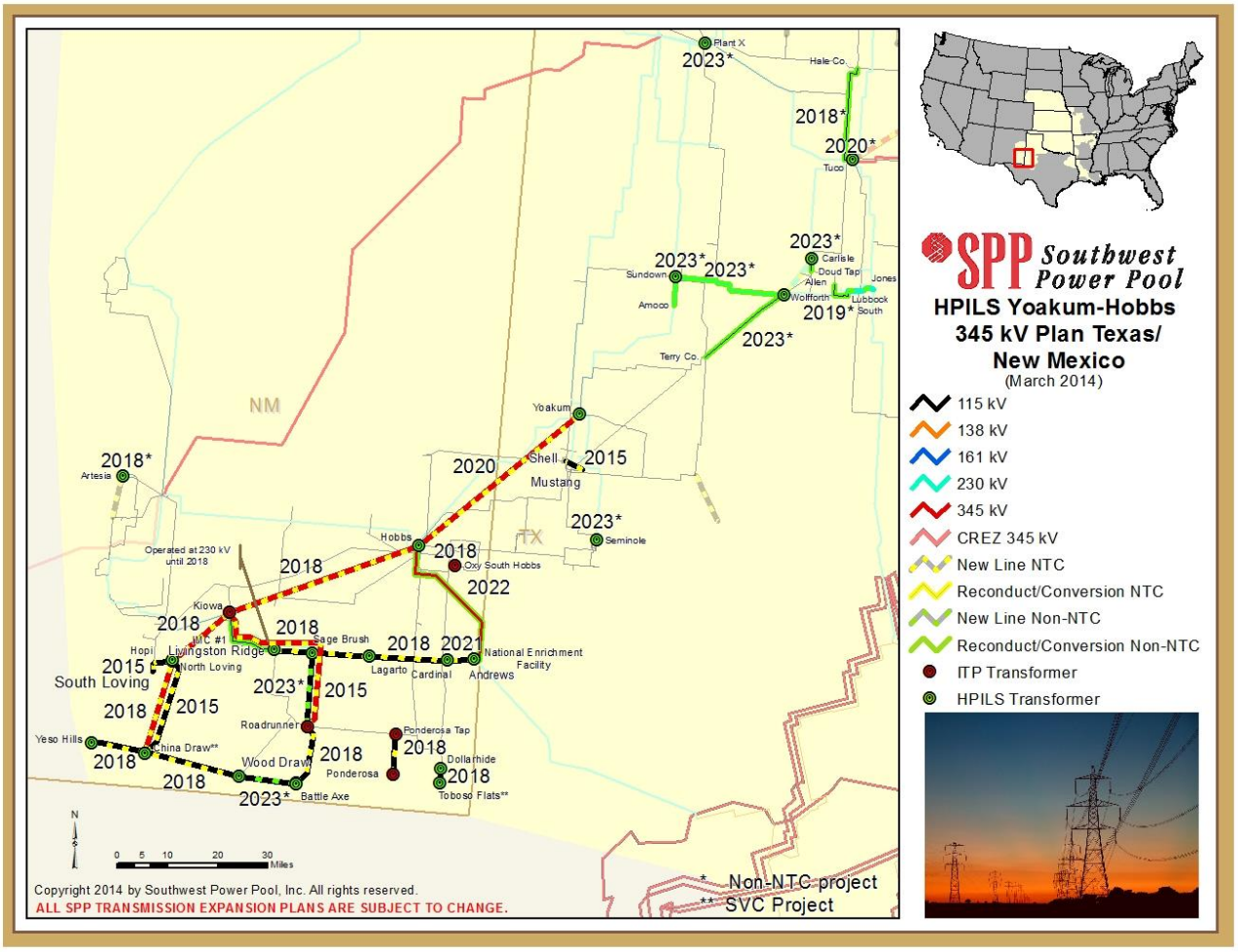


Figure 7.1: West Texas/New Mexico – Cumulative Yoakum-Hobbs Projects

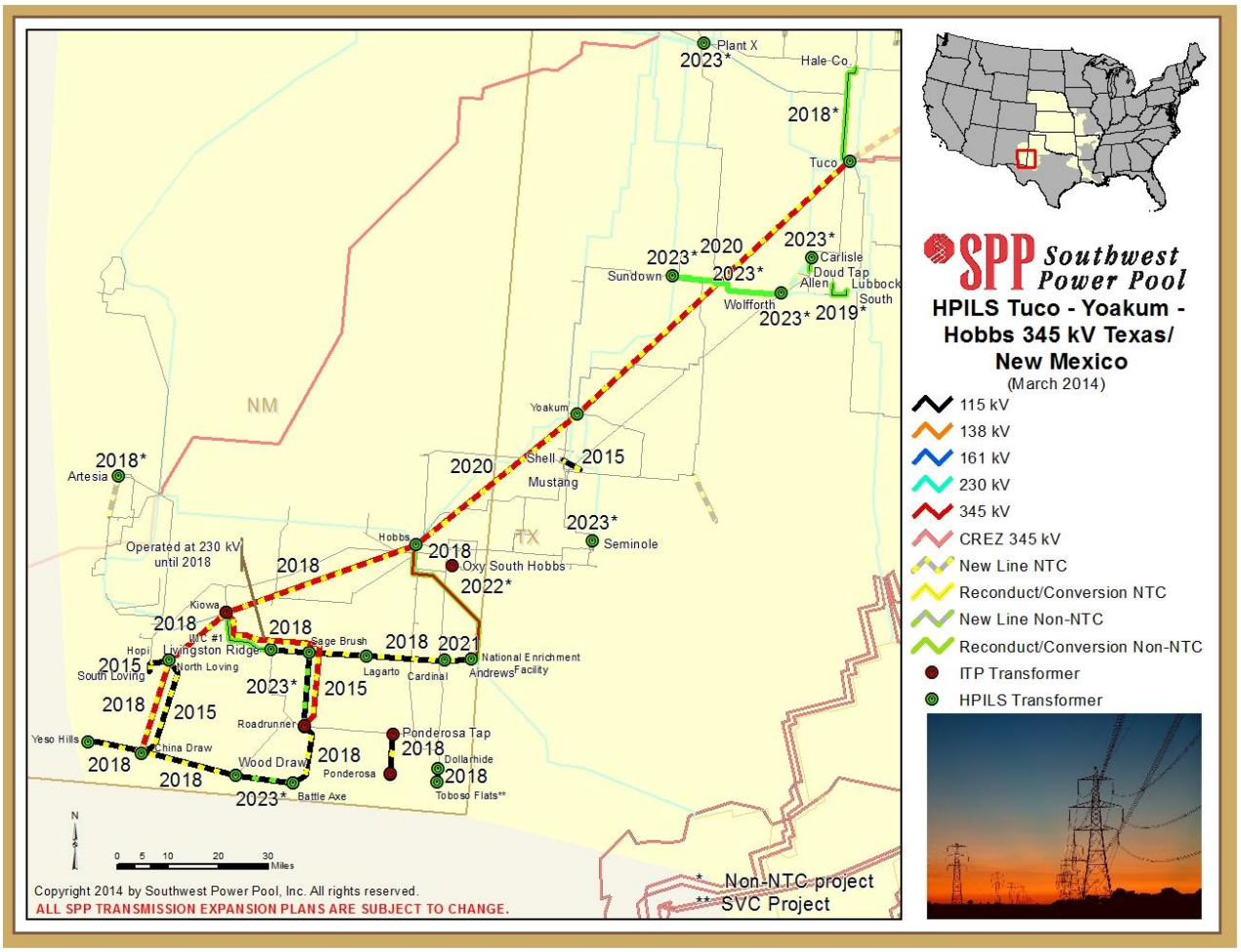


Figure 7.2: West Texas/New Mexico – Cumulative Tuco-Yoakum-Hobbs Solution

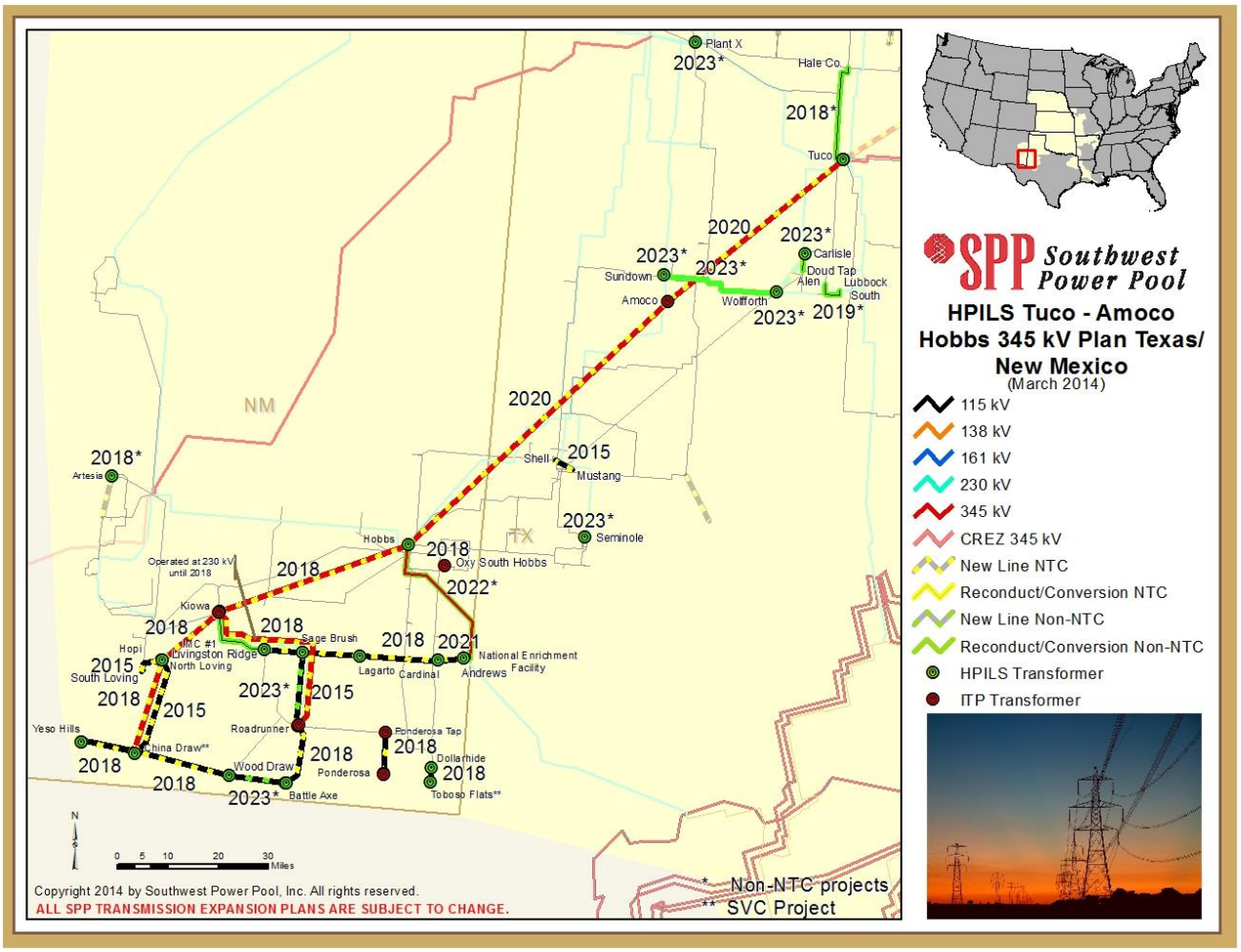


Figure 7.3: West Texas/New Mexico – Cumulative Tuco-Amoco-Hobbs Solution

Additional reliability reinforcements were required in the New Mexico area to alleviate local transmission violations not related to importing power into the area. These major upgrades are described below.

Potash Junction 345/115 kV Transformer 1

To alleviate the overload observed on the Potash Junction 230/115 kV transformer, the Potash Junction 345/230 kV transformer should be replaced with a 345/115 kV transformer which would effectively separate the Potash Junction 345 kV from the 230 kV voltage level.

Andrews – Hobbs 230 kV to 345 kV Conversion

The conversion of the Hobbs to Andrews 230 kV to 345 kV is required to serve the increased load forecast near Andrews. The conversion includes the operation of the existing Hobbs to Andrews 230 kV line at the new 345 kV voltage level and the addition of a new 345/115 kV transformer at the Andrews substation.

Road Runner – Sage Brush 115 kV line

This new 115 kV line alleviates the overloads observed on the Whitten to Ponderosa 115 kV path from the east during the outage of the Potash Junction to Road Runner 345 kV line west of the Sage Brush substation.

Plant X 230/115 kV 2nd Transformer

The Plant X 230/115 kV transformer was observed to be overloaded with the outage of Lamb County 230/115 kV transformer and other outages around Tolk. The addition of a second Plant X 230/115 kV transformer addressed this overload.

Carlisle 230/115 kV Transformer

The outage of Wolfforth 230/115 kV transformer and other outages caused the Carlisle 230/115 kV transformer to become overloaded. Upgrading the transformer to a rating of 250 MVA addressed the overloads.

Sundown – Wolfforth 230 kV Reconductor and Sundown 230/115 kV Transformer

The outage of Wolfforth to Terry County 115 kV path and other outages caused the Sundown to Wolfforth 230 kV line and Sundown 230/115 kV transformer to become overloaded. Upgrading the transformer to a rating of 250 MVA and reconductoring the Sundown to Wolfforth 230 kV line addressed the overloads.

Wolfforth 230/115 kV Transformer

The outage of Sundown to Wolfforth 230 kV line and other outages caused the Wolfforth 230/115 kV transformer to become overloaded. Upgrading the transformer to a rating of 250 MVA addressed the overloads.

Seminole 230/115 Transformers 1 and 2

The outage of one 230/115 kV transformer resulted in the remaining transformer becoming overloaded. Upgrading both transformers to a rating of 250 MVA addressed the overloads.

Carlisle – Doud Tap – Doud – Wolf Tap – Yuma 115 kV Reconductor

The path from Carlisle to Doud Tap was overloaded with the outage of the Wolfforth 230/115 kV transformer. Reconductoring of this line addressed the overload.

Battle Axe – Wood Draw 115 kV line

This new 115 kV line was required to alleviate voltage issues near Battle Axe and Road Runner 115 kV with the loss of the Road Runner 345/115 kV transformer.

Andrews – Cardinal 115 kV line

The outage of the Potash Junction to Road Runner 345 kV line or Hobbs to Potash Junction 345 kV line caused overloads on the Cardinal to Targa to NEF 115 kV line. The addition of a second path between Andrews and Cardinal addressed this overload.

Potash Junction – Intrepid – IMC #1 – Livingston Ridge 115 kV line Reconductor

The outage of Potash Junction to Road Runner 345 kV line or Road Runner 345/115 kV transformer caused overloads on the 115 kV lines from Potash Junction to Livingston Ridge path. The overloads were addressed by reconductoring the 115 kV line.

Allen – Lubbock South 115 kV Reconductor

The outage of the Wolfforth 230/115 kV transformer caused the Allen to Lubbock South 115 kV line to become overloaded. The overload can be addressed by rebuilding the 115 kV line using a 477 ACSS conductor.

7.4.2 Other Future Development Options Considered

China Draw – Battle Axe – Andrews 345 kV line

New 345 kV transmission lines to connect the China Draw, Battle Axe and Andrews 345 kV substations were evaluated as a reliability solution to deliver generation to the New Mexico area loads. However, the need for the 105 miles of 345 kV line can be delayed beyond the 2023 time frame with the recommended reinforcements of the 115 kV system in the New Mexico area. These reinforcements include the new Andrews to Cardinal 115 kV line and the Potash Junction to Intrepid to IMC#1 115 kV line upgrade described above.

7.4.3 Texas Panhandle

The following major incremental projects were identified in the Texas panhandle for the 2023 study years.

Bowers – Grapevine 115 kV Reconductor

Bowers to Grapevine was overloaded with the outage of the Wheeler to Howard 115 kV line or Wheeler 230/115 kV line. Reconductoring the Bowers to Grapevine 115 kV line addressed this overload.

Hitchland 230/115 kV 2nd Transformer

The Hitchland 230/115 kV transformer was observed to be overloaded with the outage of Hitchland to Ochiltree 230 kV line or Ochiltree 230/115 kV transformer. The additional of a second Hitchland 230/115 kV transformer addressed this overload.

Deaf Smith – Hereford 115 kV 2nd line Reconductor

Deaf Smith to Hereford 115 kV circuit 2 was observed to be overloaded with the outage of Deaf Smith to Hereford 115 kV line circuit 1. Reconductoring of the lower rated line addressed this loading violation.

Coulter – Puckett – Soncy Tap 115 kV Reconductor

The outage of Rolling Hills to Northwest 115 kV caused the Puckett to Coulter 115 kV path to become overloaded. The overload can be addressed by reconductoring the 115 kV line.

Northwest – Rolling Hills 115 kV Reconductor

The outage of the Puckett to Coulter 115 kV line or Georgia to Randall 115 kV caused the Rolling Hills to Northwest 115 kV line to become overloaded. The overload can be addressed by reconductoring the 115 kV line.

Figure 7.4 shows the cumulative (2015, 2018, and 2023) major HPILS projects identified in the Texas Panhandle for the 50/50 load forecast. The need dates for the developments shown on the diagrams are based on the reliability assessment. Note that the lead times for the projects are not reflected in these diagrams.

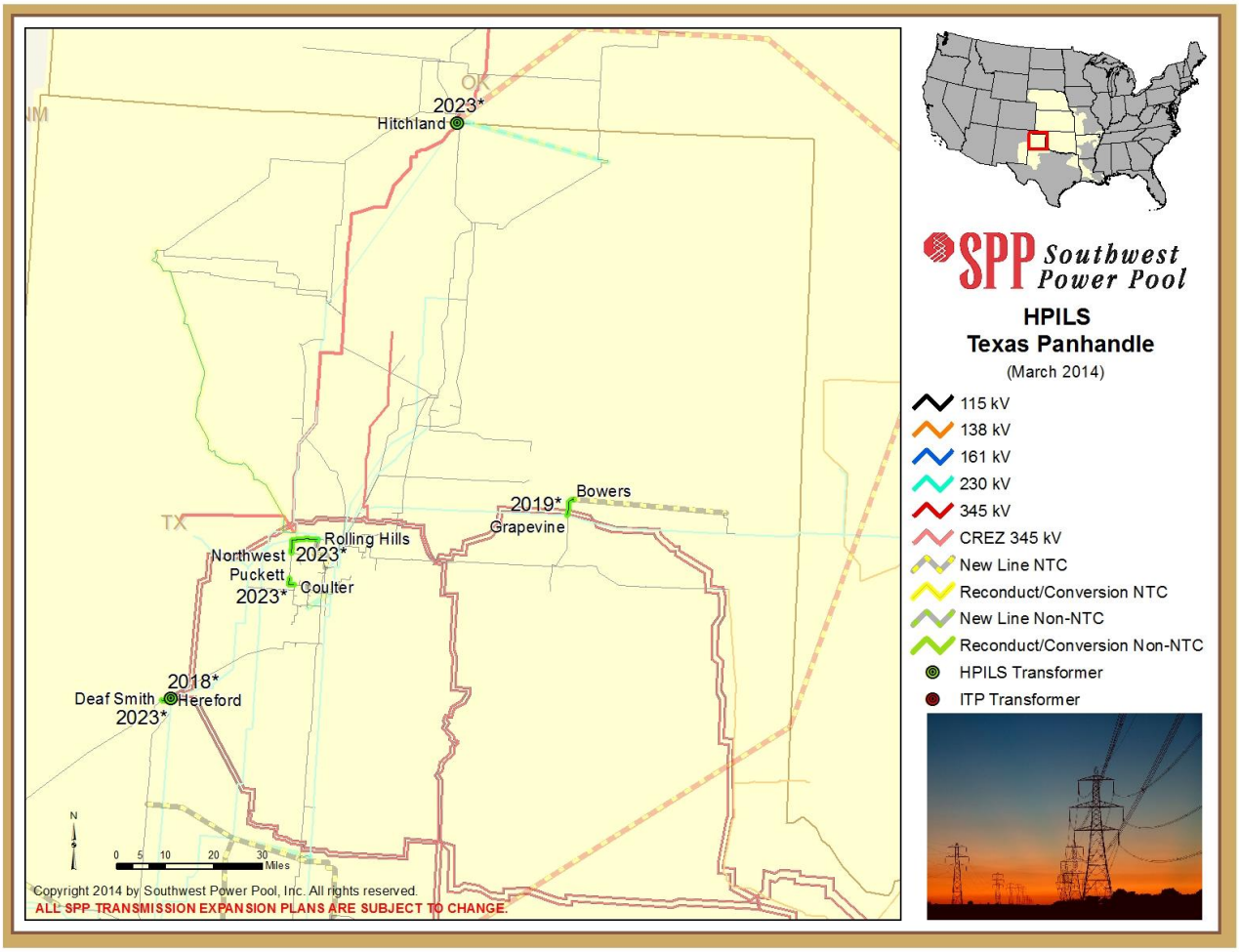


Figure 7.4: Cumulative 2015, 2018, and 2023 Projects Identified in Texas Panhandle

7.4.4 Kansas

The following major incremental projects were identified in Kansas for the 2023 study years.

Huntsville – HEC 115 kV Rebuild

The Huntsville - HEC 115 kV line rebuild and terminal upgrade at HEC are required to alleviate the overload observed with the outage of Barber to Flat Ridge 138 kV line or Barber 138/115 kV transformer. Only the 7.7 mile portion (owned by Westar) of the total 28.8 miles of this 115 kV line is rated below the required loading level. With the rebuild, the entire line will have a full rating of 83/99 MVA (normal and emergency conditions).

Barber – Medicine Lodge 138 kV line and Medicine 138/115 kV transformer

The extension of the existing 138 kV transmission network to Medicine Lodge with the addition of the new 0.3 mile 138 kV line from Barber to Medicine Lodge and the addition of a new Medicine Lodge

138/115 kV transformer alleviated voltage violations observed with the loss of the Barber to Medicine Lodge 115 kV line.

Figure 7.5 includes the cumulative 2015, 2018, and 2023 major projects identified in Kansas for the 50/50 load forecasts. The need dates for the developments shown on the diagrams are based on the reliability assessment. Note that the lead times for the projects are not reflected in these diagrams.

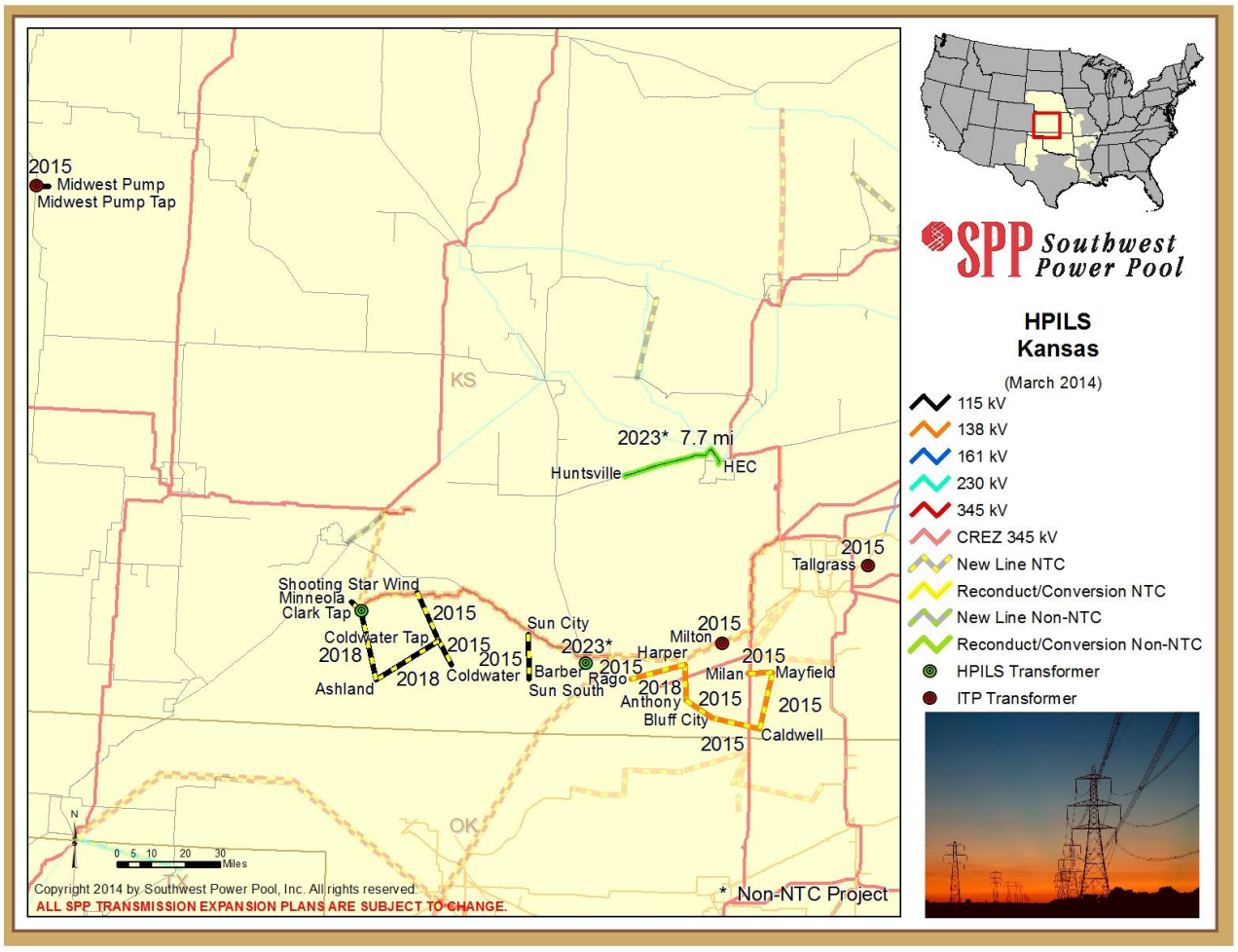


Figure 7.5: Cumulative 2015, 2018, and 2023 Projects Identified in Kansas

7.4.5 Nebraska

There were no additional major projects identified in Nebraska in the 2023 scenarios.

Figure 7.6 shows the cumulative 2015 and 2018 major projects identified in Nebraska for the 50/50 load forecasts. The need dates for the developments shown on the diagrams are based on the reliability assessment. Note that the lead times for the projects are not reflected in these diagrams.

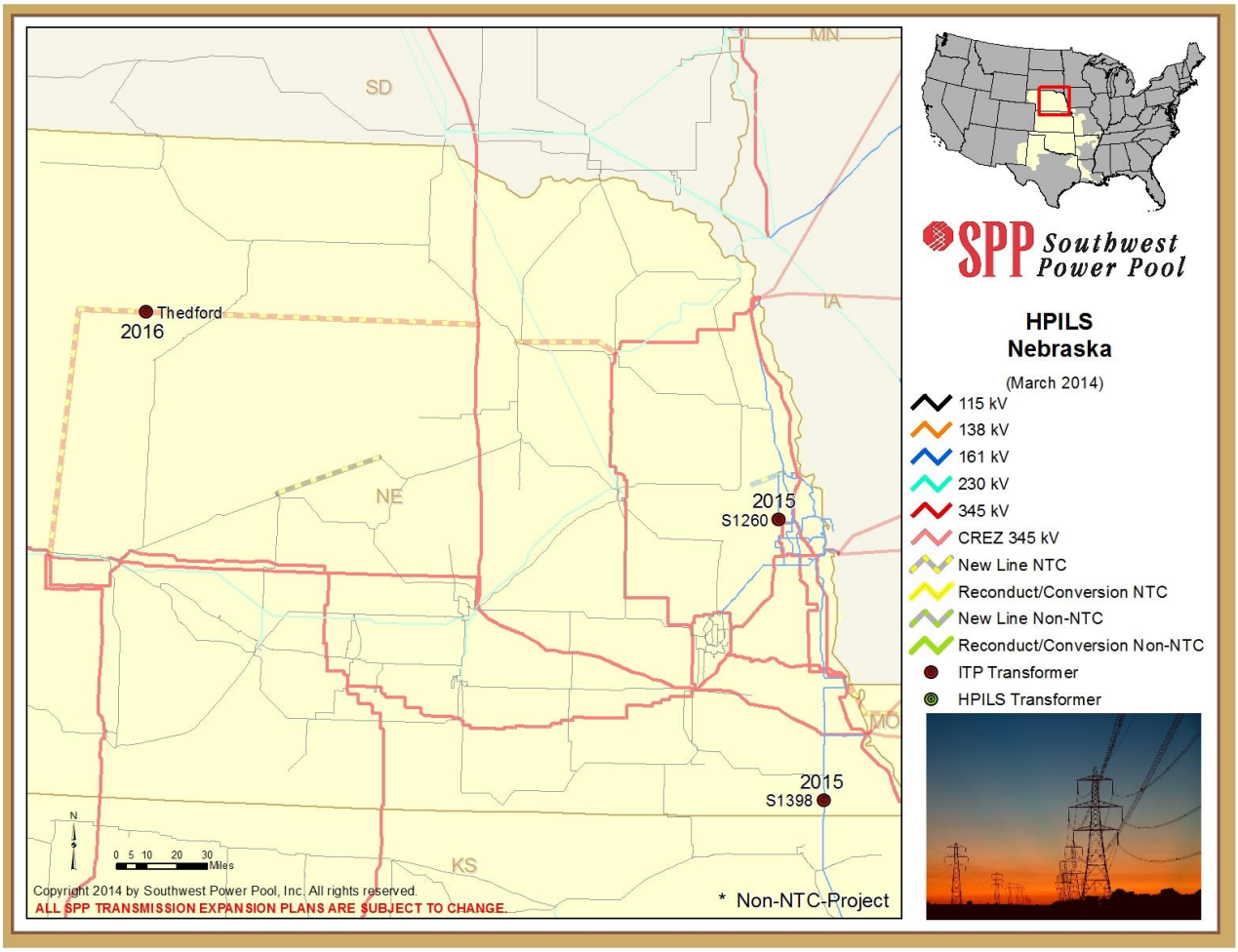


Figure 7.6: Cumulative 2015 and 2018 Projects Identified in Nebraska

7.4.6 Louisiana

The following major incremental projects were identified in Louisiana for the 2023 study years.

Messick – McDade - Benteler –500/345/138 kV Developments

The Messick, McDade and Benteler developments are required to supply the future Benteler 138 kV load. The new Messick 500/345 kV transformer will feed the new 345 kV line from Messick to McDade to the new Benteler 345/138 kV substation. The new 345/138 kV Benteler transformer will provide support for the Benteler load connected to Port Robson. These developments will alleviate the overload and voltage violations observed on Linwood to Cedar Grove to "S SHV 4".

Figure 7.7 includes the cumulative 2015, 2018, and 2023 major projects identified in Louisiana for the 50/50 load forecasts. The need dates for the developments shown on the diagrams are based on the reliability assessment. Note that the lead times for the projects are not reflected in these diagrams.

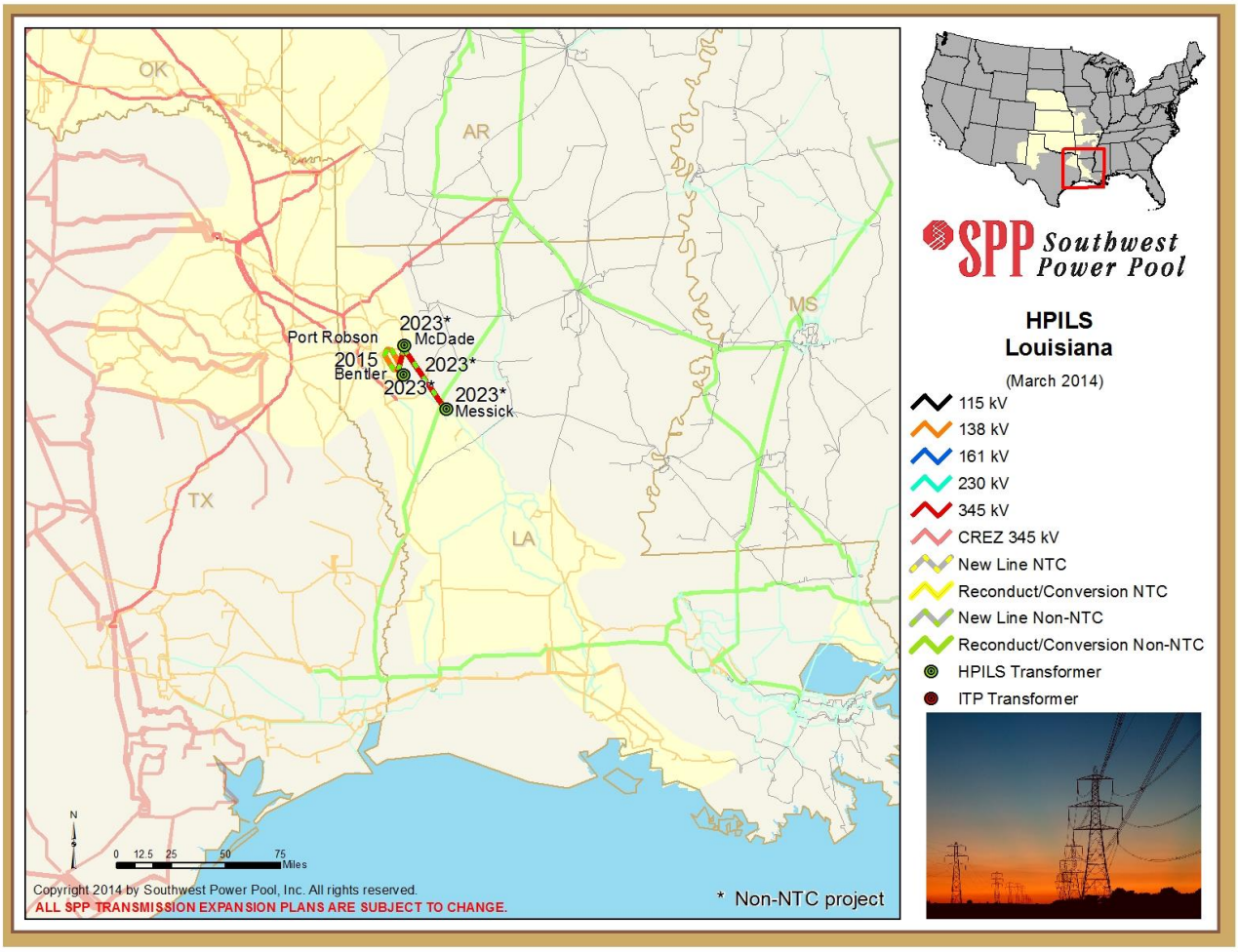


Figure 7.7: Cumulative 2015, 2018, and 2023 Projects Identified in Louisiana

7.4.7 Oklahoma

The following major incremental projects were identified in Oklahoma for the 2023 study years.

Byron – Medicine Lodge – Hazelton 138 kV Rebuild

The conversion of the existing Medicine Lodge and Hazelton 69 kV lines to 138 kV is required to alleviate load voltage levels at the Western Farmers Medicine Lodge and Hazelton substations. The two substations will be radially fed from the Byron 138 kV substation.

Chisholm 345/230 kV Development

The existing NTC for an Elk City 345/230 kV transformer and Elk City to Gracement 345 kV line was modified to move the transformer to Chisholm 345/230 kV substation, build the 345 kV line between Chisholm and Gracemont and cut into the Sweetwater to Elk City 230 kV line. The outage of Elk City (Chisholm) to Gracemont 345 kV line or Elk City (Chisholm) 345/230 kV transformer caused the Southwest Station to Carnegie to Hobart Junction 138 kV line to be overloaded. The Woodward District EHV to Border 345 kV line will need to be cut into the Chisholm 345kV substation and a second Chisholm 345/230 kV transformer will need to be installed.

Grant County - Clyde – Four Corners – Kremlin – NE Enid 138 kV line Reconductor/Rebuild

The outage of the Woodring to Waukomis Tap 138 kV line caused the Fairmont Tap to South 4th St 138 kV line to become overloaded. Reinforcing nearby 138 kV lines will alleviate this overload. This development consists of reconductoring the 138 kV line from Clyde to Four Corners to Kremlin. The 138 kV lines will be extended by rebuilding the 69 kV lines from Clyde to Grant Count and from Kremlin to NE Enid to 138 kV.

Figure 7.8 shows the cumulative (2015, 2018, and 2023) major HPILS projects identified in Oklahoma for the 50/50 load forecast. The need dates for the developments shown on the diagrams are based on the reliability assessment. Note that the lead times for the projects are not reflected in these diagrams.

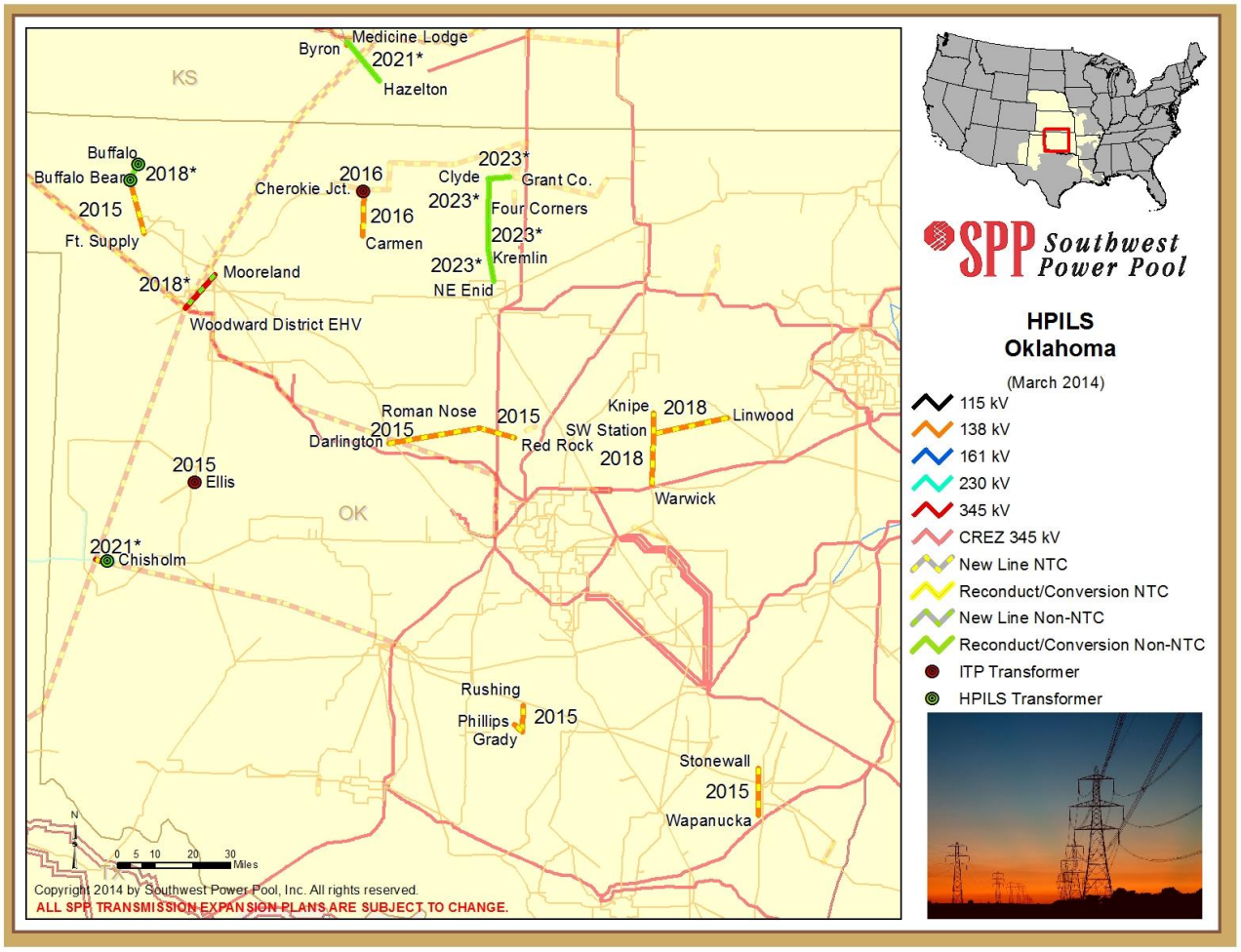


Figure 7.8: Cumulative 2015, 2018, and 2023 Projects Identified in Oklahoma

Table 7.6 shows the list of projects identified for the 2023 50/50 forecast including projects needed by 2019, 2020, 2021 and 2022. Note that for the evaluation of the modified NTC-Cs, all projects associated with the three options are included in the list. The final HPILS Portfolio contains a select set of these projects based on the selected West Texas/New Mexico alternative.

State(s)	Upgrade Name	Issue NTC	50/50 Need Year
KS	Cowskin - Goddtap 69 kV Terminal Upgrades	No	2019
KS	Atchison - Maur Hill - Kerford 69 kV Ckt 1 Rebuild	No	2020
KS	Atchison Rebuilds Phase 1	No	2020
KS	Barber - Medicine Lodge 138 kV Ckt 1	No	2023
KS	Barber 138/115 kV Ckt 1 Transformer	No	2023
KS	HEC - Huntsville 115 kV Ckt 1 Rebuild	No	2023
KS	Minneola 115 kV Cap Bank	No	2023
KS	Manning 115 kV Cap Bank	No	2023
LA	Benteler - McDade 345 kV Ckt 1	No	2023
LA	McDade 345/138 kV Ckt 1 Transformer	No	2023
LA	Messick 500/345 kV Ckt 1 Transformer	No	2023
LA	McDade - Messick 345 kV Ckt 1	No	2023
LA	Benteler 345/138 kV Ckt 1 Transformer	No	2023
LA	Benteler 345 kV Ckt 1 Terminal Upgrades	No	2023
LA	McDade 345 kV Ckt 1 Terminal Upgrades	No	2023
LA	Messick 500 kV Ckt 1 Terminal Upgrades	No	2023
NE	Plattesmouth - S985 69 kV Ckt 1 Terminal Upgrades	No	2023
NE	S906 - S928 69 kV Ckt 1 Rebuild	No	2023
NE	JCT205 - S901 69 kV Ckt 1 Rebuild	No	2023
NE	JCT205 - S910 69 kV Ckt 1 Rebuild	No	2023
NM	Potash Junction 345/115 kV Ckt 1 Transformer	No	2019
NM	Andrews 345/115 kV Ckt 1 Transformer	No	2022
NM	Andrews - Hobbs 345 kV Ckt 1 Voltage Conversion	No	2022
NM	Andrews - Cardinal 115 kV Ckt 1	No	2021
NM	Road Runner - Sage Brush 115 kV Ckt 1	No	2023
NM	Battle Axe - Wood Draw 115 kV Ckt 1	No	2023
NM	Terry County - Wolfforth 115 kV Ckt 1 Reconductor	No	2023
NM	Livingston Ridge - IMC #1 Tap 115 kV Ckt 1 Reconductor	No	2023
NM	Intrepid West Tap- Potash Junction 115 kV Ckt 1 Reconductor	No	2023
NM	IMC #2 - Intrepid West Tap 115 kV Ckt 1 Reconductor	No	2023
NM	Curry 115 kV Load Move	No	2023
NM	Oasis - Roosevelt County Interchange Switch 115 kV Ckt 1 Terminal Upgrades	No	2023
OK	Border - Chisholm 345 kV Ckt 1	No	2021
OK	Chisholm - Woodward District EHV 345 kV Ckt 1	No	2021
OK	Chisholm 345 kV Ckt 2 Terminal Upgrades	No	2021
OK	Chisholm 345/230 kV Ckt 2 Transformer	No	2021
OK	Thomas Tap - Weatherford 69 kV Ckt 1 Rebuild	No	2021
OK	Roosevelt - Snyder 69 kV Ckt 1 Rebuild	No	2021
OK	Byron - Medlodge 138 kV Ckt 1 Rebuild	No	2021
OK	Hazelton - Medlodge 138 kV Ckt 1 Rebuild	No	2021
OK	Clyde - Grant County 138 kV Ckt 1 Rebuild	No	2023
OK	Clyde - Four Corners 138 kV Ckt 1 Reconductor	No	2023

State(s)	Upgrade Name	Issue NTC	50/50 Need Year
OK	Four Corners - Kremlin 138 kV Ckt 1 Reconductor	No	2023
OK	Kremlin - NE Enid 138 kV Ckt 1 Rebuild	No	2023
OK	Gypsum - Russell 69 kV Ckt 1 Rebuild	No	2023
OK	El Dorado Junction - Gypsum 69 kV Ckt 1 Rebuild	No	2023
OK	El Dorado - Lake Pauline WTU 69 kV Ckt 1 Rebuild	No	2023
OK	Sandridge 138 kV Cap Bank	No	2023
OK	Brady 69 kV Cap Bank	No	2023
OK	Cleo 69 kV Cap Bank	No	2023
OK	Saline 69 kV Cap Bank	No	2023
OK	Sugden 69 kV Cap Bank	No	2023
OK	Walville 69 kV Cap Bank	No	2023
OK	Glasses - Russet 138 kV Ckt Terminal Upgrades	No	2023
OK	Kinzie - 19th Street 138 kV Ckt 1 Terminal Upgrades	No	2023
TX	Allen Substation – Lubbock South Interchange 115 kV Ckt 1 Rebuild	No	2019
TX	Big Sandy - Perdue 69 kV Ckt 1 Rebuild	No	2019
TX	Bowers - Grapevine 115 kV Reconductor	No	2019
TX	Tuco 345/230 kV Ckt 3 Transformer	No	2020
TX	Jones - Lubbock South 230 kV Ckt 3	No	2023
TX	Tuco 230/115 kV Ckt 1 Transformer	No	2022
TX	Hitchland 230/115 kV Ckt 2 Transformer	No	2023
TX	Carlisle 230/115kV Ckt 1 Transformer	No	2023
TX	Sundown - Wolfforth 230 kV Ckt 1 Reconductor	No	2023
TX	Sundown 230/115 kV Ckt 2 Transformer	No	2023
TX	Plant X 230/115 kV Ckt 2 Transformer	No	2023
TX	Seminole 230/115 kV Ckt 1 Transformer	No	2023
TX	Seminole 230/115 kV Ckt 2 Transformer	No	2023
TX	Wolfforth 230/115 kV Ckt 1 Transformer	No	2023
TX	Deaf Smith - Hereford 115 kV Ckt 2 Reconductor	No	2023
TX	Puckett - Soncy Tap 115 kV Ckt 1 Reconductor	No	2023
TX	Coulter - Puckett 115 kV Ckt 1 Reconductor	No	2023
TX	Northwest - Rolling Hills 115 kV Reconductor Ckt 1	No	2023
TX	Sundown 230/115 kV Ckt 1 Transformer	No	2023
TX	Bowers 115 kV Load Move	No	2023
TX	Acuff - Idalou 69 kV Ckt 1	No	2023
TX	Vickers 115 kV Load Move	No	2023
TX	Tuco 230/115 kV Ckt 3 Transformer	No	2023
TX	Carlisle - Doud Tap 115 kV Ckt 1 Reconductor	No	2023
TX	Doud - Doud Tap 115 kV Ckt 1 Reconductor	No	2023
TX	Doud Tap - Wolf Tap 115 kV Ckt 1 Reconductor	No	2023
TX	Wolf Tap - Yuma 115 kV Ckt 1 Reconductor	No	2023
TX	Hughes Springs - Jenkins REC T 69 kV Ckt 1 Rebuild	No	2023
TX	Castro 115 kV Cap Banks	No	2023
TX	Graham 115 kV Cap Banks	No	2023

State(s)	Upgrade Name	Issue NTC	50/50 Need Year
TX	Newtext 115 kV Cap Bank	No	2023
TX	Lone Star South - Wilkes 138 kV Ckt 1 Terminal Upgrades	No	2023
TX	Lubbock South - Wolfforth 230 kV Ckt 1 Terminal Upgrades	No	2023
TX	Frankford Sub - Murphy 115 kV Ckt 1 Terminal Upgrades	No	2023
TX	Amoco - Tuco 345 kV Ckt 1*	NTC-C Modify	2020
TX	Amoco 345/230 kV Transformer Ckt 1*	NTC-C Modify	2020
TX	Yoakum 345/230 kV Ckt 1 Transformer*	NTC-C Modify	2020
TX	Yoakum 345 kV Ckt 1 Terminal Upgrades*	NTC-C Modify	2020
TX	Tuco - Yoakum 345 kV Ckt 1*	NTC-C Modify	2020
TX/NM	Amoco - Hobbs 345 kV Ckt 1*	NTC-C Modify	2020
TX/NM	Hobbs - Yoakum 345 kV Ckt 1*	NTC-C Modify	2020

*Note that these upgrades are related to the three modified NTC-C's

Table 7.6: Reliability Projects Needed by 2023 for 50/50 Load Forecast

7.4.8 2023 90/10 Incremental Reliability Projects

In addition to the reliability projects identified as being needed for the 2023 50/50 HPILS load forecast, the following additional projects were identified for the 2023 90/10 HPILS load forecast as shown in Table 7.7 below.

State(s)	Upgrade Name	Issue NTC	90/10 Need Year
KS	Milan 138 kV Cap Bank	No	2023
LA	Center 345/138 kV Ckt 1 Terminal Upgrades	No	2023
LA	Western Electric Tap - Stonewall 138 kV Ckt 1 Terminal Upgrades	No	2023
NE	Stuart - SW Holt 115 kV Ckt 1	No	2023
NE	SW Holt 345 kV Substation	No	2023
NE	SW Holt 345/115 kV Ckt 1 Transformer	No	2023
NE	S1258 345/161 kV Ckt 1 Transformer	No	2023
NE	Fullerton - PS24 115 kV Ckt 1	No	2023
NE	S1258 345 kV Terminal Upgrades	No	2023
NM	Battle Axe 345 kV Ckt 1 Terminal Upgrades	No	2019
NM	China Draw 345 kV Ckt 1 Terminal Upgrades #2	No	2019
NM	Battle Axe - Road Runner 345 kV Ckt 1	No	2019
NM	Battle Axe 345/115 kV Ckt 1 Transformer	No	2019
NM	Dollarhide - South Jal Sub 115 kV Ckt 1 Reconductor	No	2023
NM	Ochoa - Ponderosa Tap 115 kV Ckt 1 Reconductor	No	2023
NM	Ponderosa Tap - Whitten 115 kV Ckt 1 Reconductor	No	2023
NM	Potash Junction 345/115 kV Ckt 2 Transformer	No	2019
OK	Park Lane - Seminole 138 kV Ckt Terminal Upgrades	No	2023
OK	Seminole - Vanoss 138 kV Ckt Terminal Upgrades	No	2023
OK	Glencoe 138 kV Cap Bank	No	2023
OK	Keystone - Wekiwa 69 kV Ckt 1 Rebuild	No	2023
OK	Nowata - Watova 138 kV Ckt 1 Terminal Upgrade	No	2023
TX	Center 345/138 kV Ckt 1 Transformer	No	2023
TX	McLean - Wheeler 115 kV Ckt 1	No	2023
TX	Lubbock South - Woodrow 115 kV Ckt 1 Reconductor	No	2023
TX	Amoco - Sundown 230 kV Ckt 1 Reconductor	No	2023
TX	Big Sandy - Hawkins 69 kV Ckt 1 Rebuild	No	2023
TX	Mineola - Grand Saline 69 kV Ckt 1 Rebuild	No	2023
TX	North Mineola - Quitman 69 kV Ckt 1 Rebuild	No	2023
TX	Adora - Adora Tap 138 kV Ckt 1 Rebuild	No	2023
TX	Adora - Winfield 138 kV Ckt 1 Rebuild	No	2023
TX	Blocker - Blocker Tap 69 kV Ckt 1 Reconductor	No	2023
TX	Rockhill 138/69 kV Ckt 2 Transformer	No	2023
TX	Lone Star South - Pittsburgh 138 kV Ckt 1 Terminal Upgrades	No	2023
TX	New Prospect - Rockhill 138 kV Ckt 1 Terminal Upgrades	No	2023
TX	Rockhill 138 kV Ckt 2 Terminal Upgrades	No	2023
TX/LA	Center - Dolet Hills 345 kV Ckt 1	No	2023

Table 7.7: Incremental Reliability Projects Needed by 2023 for 90/10 Load Forecast

7.5 Evaluation of NTC-C Projects

Three suspended NTC-Cs were reevaluated to determine if these projects would be needed as reliability or economic projects for HPILS.

7.5.1 Tuco to New Deal 345 kV

No reliability or economic needed was identified for this project. Therefore, the Tuco to New Deal 345 kV was not identified as being needed in the HPILS process.

7.5.2 Grassland to Wolfforth 230 kV line

This project was re-evaluated and was not needed when the Tuco-Amoco-Hobbs or the Tuco-Yoakum-Hobbs West Texas/New Mexico options were in place. The project was also not needed with the Yoakum-Hobbs development in place if the Lubbock South to Jones 230 kV circuit recommended as part of the Yoakum-Hobbs solution can be constructed. The Grassland to Wolfforth 230 kV line will only be considered if the Yoakum-Hobbs option is selected and if the Lubbock to Jones 230 kV line is not constructible. However, considering 230 kV developments in the Lubbock area, additional reinforcement may no longer be needed in this area.

7.5.3 Tuco to Amoco to Hobbs 345 kV line

This project was identified as one of three possible reliability solutions needed to provide a 345 kV source into the New Mexico area load pocket.

Two alternate solutions were developed and compared to the Tuco-Amoco-Hobbs (TAH) project as described in the West Texas/New Mexico discussion in *Section 7.4 2023 Reliability Assessment*. The reliability projects associated with the TAH and the two alternate solutions, Yoakum-Hobbs (YH) and Tuco-Yoakum-Hobbs (TYH) were evaluated and compared. In addition, the economic benefits of the three reliability solutions (including the TAH line) were investigated as detailed in *8 Economic Assessment* below. The selection of the TYH solution as a modification to the re-evaluated Tuco-Amoco-Hobbs 345 kV line is discussed in *Section 9.1 Project Selection* and *Section 9.4 HPILS Projects Recommended for NTCs*.

7.6 Generation Outlet and Load Facility Assessment

The Economic Study Working Group on January 16, 2014 recognized that potential overloading of generator outlet facilities near the point of interconnection creates reliability needs when connecting new generation, potentially increases congestion in the region, and skews B/C ratio of economic projects.

The HPILS included a Generation Outlet and Load Facility (GOLF) Assessment for HPILS generation in the model used to serve HPILS load. The GOLF Assessment identified transmission projects required for load or generation connection with a 20% Outage Transfer Distribution Factor (OTDF) or greater. The assessment distinguished between projects needed to serve load and projects needed to interconnect the HPILS generation. This assessment determined that the Mooreland to Woodward District 345 kV line is a “but for” HPILS Generation Outlet Facility.

8 Economic Assessment

An economic assessment was performed after reliability projects were identified and incorporated into the economic models. The economic assessment was used to reevaluate the Tuco-Amoco-Hobbs 345 kV project (TAH) that had previously received an NTC-C. The NTC-C for TAH had been suspended by the BOD in April 2013 due to receipt of a refined cost estimate that indicated considerably higher costs than what had been assumed when it was first approved as an economic project out of the 2012 ITP 10. The BOD directed that the project be reevaluated to see if it still provided net benefits given the new cost estimate. The reevaluation was performed in HPILS because it provided the best opportunity to complete a robust evaluation of continued need for the project under updated assumptions. SPP not only reevaluated TAH in HPILS but also developed variations of the project to ascertain whether a better option was available to not only address reliability needs but also provide economic benefits of relieving congestion and reducing APC in the area and within the region. TAH and two optional projects, described below as West Texas/New Mexico reliability alternatives, were modeled and evaluated separately in conjunction with the other projects needed to meet HPILS reliability needs to determine which of these alternatives would be the most attractive to carry through to the final project portfolio from an APC savings perspective.

In this section, all values for APC savings reflect those savings expected over a one year period for the 2023 model year.

8.1 Evaluation of West Texas/New Mexico Reliability Alternatives

Each of the three West Texas/New Mexico reliability alternatives, as previously discussed in *Section 7.4 2023 Reliability Assessment*, were tested on the HPILS 2023 50/50 economic model on an incremental basis. In order to capture the incremental benefits of the broader reliability portfolio, a base case model without the reliability portfolio was developed and compared against multiple change case models. One change case reflected the incremental reliability projects except for the specific West Texas/New Mexico reliability alternatives and the other models reflected the full reliability portfolio build out including each of the West Texas/New Mexico reliability alternatives.

The first comparison in Table 8.1 shows that the reliability portfolio without the West Texas/New Mexico projects provides approximately $151.6 M in reduced APC to the SPP footprint. The second comparison in Table 8.1 compares the total APC of the base case reliability model to a final reliability portfolio that includes each of the West Texas/New Mexico reliability alternatives. As shown, the TYH reliability configuration has a benefit of $167.9 M of APC savings, the highest benefit to the SPP footprint among the reliability configurations compared.

Please refer to Appendix D for a complete list of SPP transmission service customers and other customers represented in the SPP footprint calculation.

SPP Footprint Summary			
Adjusted Production Cost Delta (2023$, Millions)			
Base Case Comparison to Incremental Reliability Portfolio without West TX/NM Alternatives			
SPP TS Customers Benefits	$ (152.0)		
SPP Other Benefits (SWPA)	$ 0.4		
TOTAL (TS Customers + Other)	$ (151.6)		
Base Case Comparison to Reliability Portfolio with West TX/NM Alternatives			
	TAH	**YH**	**TYH**
SPP TS Customers Benefits	$ (163.6)	$ (137.5)	$ (167.6)
SPP Other Benefits (SWPA)	$ (0.3)	$ (0.1)	$ (0.3)
TOTAL (TS Customers + Other)	$ (164.0)	$ (137.5)	$ (167.9)
Regional[1] SPP TSC APC Delta Breakdown (2023$, Millions)			
AR	$ (0.2)	$ 1.0	$ 0.1
KS	$ (9.4)	$ (9.6)	$ (9.1)
LA	$ -	$ (0.2)	$ -
MO	$ (2.1)	$ (2.4)	$ (1.6)
NE	$ 2.7	$ 0.7	$ 1.3
NM	$ (38.0)	$ (24.5)	$ (40.2)
OK	$ (0.8)	$ (5.6)	$ (2.3)
TX	$ (113.1)	$ (100.5)	$ (113.6)

[1]Regional benefits exclude SPP IPP entities.

Table 8.1: 2023 50/50 Incremental Reliability Portfolio APC Delta

Table 8.2 shows the zonal breakdown of the total APC of the base case reliability model to a final reliability portfolio that includes the TYH option of the West Texas/New Mexico reliability alternative. The SPS zone is showing the largest amount of benefit with $155.6 M in reduced APC savings. This includes benefits experienced by Golden Spread, the City of Lubbock, and other New Mexico Coops.

Zonal SPP TSC APC Delta Breakdown (2023$, Millions)		
Zone		**APC**
AEPW	$	0.4
EMDE	$	(0.2)
GMO	$	0.8
GRDA	$	0.1
KCPL	$	(3.3)
LES	$	0.0
MIDW	$	(2.6)
MKEC	$	(1.5)
NPPD	$	1.2
OKGE	$	0.9
OPPD	$	0.1
SPCIUT	$	(0.6)
SUNC	$	3.1
SWPS	$	(155.6)
WFEC	$	(1.4)
WRI	$	(6.4)
Total	**$**	**(165.1)**

Table 8.2: 2023 50/50 TYH Incremental Reliability Portfolio APC Delta, Zonal Breakdown

Table 8.3 compares the total APC resulting from the portfolio that includes all identified reliability projects except for the West Texas/New Mexico reliability alternatives to the same portfolio that includes the West Texas/New Mexico reliability alternatives. This comparison demonstrates that the YH reliability configuration reduces the APC savings provided by the reliability portfolio. It is important to note that YH requires $35 M of reliability projects in and around Lubbock that are not needed, if TYH is the recommended solution. The TAH and TYH reliability configurations show a benefit of $12.4 M and $16.3 M, respectively. The TYH reliability configuration has both a higher incremental economic benefit and lower incremental cost than TAH. It is also important to note that at least one of these three options must be included in the reliability portfolio to solve the identified reliability needs. This analysis helps identify which option is the most preferable based on economic benefits provided.

SPP Footprint Summary			
Adjusted Production Cost Delta (2023$, Millions)			
Incremental Reliability Portfolio to Reliability Portfolio with West TX/NM Alternatives			
	TAH	**YH**	**TYH**
SPP TS Customers Benefits	$ (11.6)	$ 14.5	$ (15.6)
SPP Other Benefits (SWPA)	$ (0.8)	$ (0.5)	$ (0.8)
TOTAL (TS Customers + Other)	$ (12.4)	$ 14.1	$ (16.3)
Project Cost (2023$, Millions)			
1 Yr Project Cost	$ 52.0	$ 22.4	$ 48.0
Benefit / Cost Ratio Summary			
SPP TS Customers Benefits	0.22	(0.65)	0.33
SPP Other Benefits (SWPA)	0.02	0.02	0.02
TOTAL (TS Customers + Other)	0.24	(0.63)	0.34

Table 8.3: 2023 50/50 West Texas/New Mexico Reliability Alternatives APC Delta

The YH reliability configuration represents the lowest incremental cost solution, even considering the $35 M of reliability projects in and around Lubbock that are not needed with TYH. However, both the TAH and TYH configurations indicate greater economic benefits to the SPP footprint, with the TYH configuration showing the greatest incremental economic benefit. To demonstrate that the larger TYH reliability solution can be supported based on economic benefit, the APCs of the TYH configuration and the YH configuration excluding the reliability projects in and around Lubbock (shown below as YH') were compared to reflect the incremental value of extending the Yoakum-Hobbs line on to Tuco. The extension from Yoakum to Tuco is shown in Table 8.4 as TY. As shown in Table 8.4, the incremental economic benefit of TY is approximately $33 M at an incremental one-year project cost of $32.5 M. This results in a benefit/cost ratio of 1.02 for the incremental TY project when added as an economic enhancement to the YH' solution.

SPP Footprint Summary	*YH'*	*TYH*	*TY*
Adjusted Production Cost Delta (2023$, Millions)			
SPP TS Customers Benefits	$ 17.4	$ (15.6)	$ (33.0)
SPP Other Benefits (SWPA)	$ (0.6)	$ (0.8)	$ (0.2)
TOTAL (TS Customers + Other)	$ 16.8	$ (16.3)	$ (33.1)
Project Cost (2023$, Millions)			
1 Yr. Project Cost	$ 15.5	$ 48.0	$ 32.5
Benefit / Cost Ratio Summary			
SPP TS Customers Benefits	(1.12)	0.33	1.02
SPP Other Benefits (SWPA)	0.04	0.02	0.01
TOTAL (TS Customers + Other)	(1.08)	0.34	1.02

Table 8.4: 2023 50/50 Inferred B/C of TY

The TYH reliability configuration is the best performing of the three options considered because it is an integral part of the portfolio needed to solve reliability needs in the West Texas/New Mexico area and adds the greatest regional APC benefit to the portfolio.

8.2 Economic Needs Assessment

For further information and discussion on the economic needs assessment performed as part of the study, please refer to Appendix E.

PART III: DESIGNS & PORTFOLIOS

9 Finalized Portfolio

9.1 Project Selection

Three major reliability solutions were developed to meet the reliability needs in the New Mexico area as described and evaluated in *Section 7 Reliability Assessment* and *Section 8 Economic Assessment* above.

The three reliability options; Tuco-Amoco-Hobbs (TAH), Yoakum-Hobbs (YH) and Tuco-Yoakum-Hobbs (TYH) , were compared based on their economic benefit as well as their corresponding Benefit/Cost ratios and the results showed that the TYH option provided the highest reduction in APC. In addition, the Tuco-Yoakum section of the TYH 345 kV line provided incremental economic value greater than its cost.

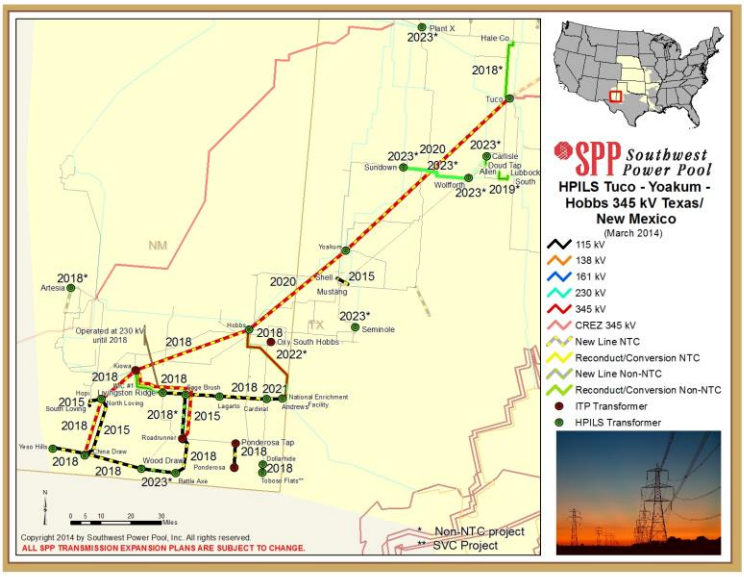


Figure 9.1: Preferred West Texas/New Mexico Development

Although all three options satisfied the reliability needs, the TYH (shown in Figure 9.1) was in the West Texas/New Mexico area developments based on its higher economic performance that results in APC savings in excess of its cost.

The reliability projects in the final HPILS Portfolio are based on this TYH selection and are presented in more detail below.

9.1.1 Projects Excluded from the HPILS Portfolio

Note that projects recommended as part of the ITPNT, although identified as a need in the HPILS reliability assessments have been excluded from the final HPILS Portfolio since these projects have received NTCs through the 2014 ITPNT process.

In addition, through the iterative process of reducing the scale of the transmission development to serve the 50/50 load forecasts, other projects such as the 105 miles of 345 kV transmission lines between China Draw, Battle Axe and Andrew substations were removed from the HPILS Portfolio. These projects were recommended by stakeholders as shown in the SPS "Plan to Serve Load" in Appendix F. The total conceptual cost estimate for these specific projects is approximately $124 M.

For details regarding some of the larger 2014 ITPNT projects not included in the final HPILS Portfolio, see Appendix B.

9.2 Finalized Portfolio Projects

The projects listed in Table 9.1 below are the major[14] projects included in the finalized HPILS Portfolio. Although the combined project portfolio provides an economic benefit (reduced APC), each of the projects provides primarily a reliability function with the exception of the Tuco to Yoakum 345 kV line.

State(s)	Upgrade Name	Issue NTC	50/50 Need Date	90/10 Need Date	Cost Estimate
KS	Harper - Rago 138 kV Ckt 1	Yes	2015	2015	$13,666,262
KS	Anthony - Bluff City 138 kV Ckt 1	Yes	2015	2015	$8,335,592
KS	Bluff City - Caldwell 138 kV Ckt 1	Yes	2015	2015	$19,286,271
KS	Caldwell - Mayfield 138 kV Ckt 1	Yes	2015	2015	$14,413,382
KS	Mayfield - Milan 138 kV Ckt 1	Yes	2015	2015	$15,155,080
KS	Coldwater Tap - Shooting Star Wind 115 kV Ckt 1	Yes	2015	2015	$13,724,798
KS	Coldwater - Coldwater Tap 115 kV Ckt 1	Yes	2015	2015	$7,028,362
KS	Clark Tap - Minneola 115 kV Ckt 1	Yes	2015	2015	$6,602,085
KS	Midwest Pump Tap 115 kV Substation	Yes	2015	2015	$4,100,000
KS	Clark Co. 345/115 kV Ckt 1 Transformer	Yes	2015	2015	$10,516,124**
KS	Ashland - Coldwater Tap 115 kV Ckt 1	Yes	2018	2018	$21,596,406
KS	Ashland - Clark Tap 115 kV Ckt 1	Yes	2018	2018	$21,963,871
KS	Anthony - Harper 138 kV Ckt 1	Yes	2018	2015	$20,992,491
KS	Sun City - Sun South 115 kV Ckt 1	No	2015	2015	$13,684,312
KS	Midwest Pump - Midwest Pump Tap 115 kV Ckt 1	No	2015	2015	$3,689,116
KS	Milton 138 kV Substation	No	2015	2015	$4,100,000
KS	Tallgrass 138 kV Substation	No	2015	2015	$4,100,000
KS	Atchison Rebuilds Phase 1	No	2020	2020	$7,740,000
KS	HEC - Huntsville 115 kV Ckt 1 Rebuild	No	2023	2023	$6,042,249
KS	Barber - Medicine Lodge 138 kV Ckt 1	No	2023	2018	$217,378
KS	Barber 138/115 kV Ckt 1 Transformer	No	2023	2018	$2,810,198
KS	Clearwater - Milan Tap 138 kV Rebuild (WR)	No		2018	$10,688,169
KS	Clearwater - Milan Tap 138 kV Ckt 1 Rebuild	No		2018	$10,688,169

[14] Excludes terminal upgrades, capacitor banks and any reinforcement lower than 100 kV

State(s)	Upgrade Name	Issue NTC	50/50 Need Date	90/10 Need Date	Cost Estimate
	(MKEC)				
LA	Benteler - Port Robson 138 kV Ckt 1	Yes	2015	2015	$2,248,743
LA	Benteler - Port Robson 138 kV Ckt 2	Yes	2015	2015	$2,548,575
LA	Benteler - McDade 345 kV Ckt 1	No	2023	2018	$13,083,537
LA	McDade 345/138 kV Ckt 1 Transformer	No	2023	2018	$10,516,124
LA	Messick 500/345 kV Ckt 1 Transformer	No	2023	2018	$19,718,950
LA	McDade - Messick 345 kV Ckt 1	No	2023	2018	$45,792,379
LA	Benteler 345/138 kV Ckt 1 Transformer	No	2023	2018	$10,516,124
NE	S1260 161 kV Substation	Yes	2015	2015	$4,636,045
NE	S1398 161 kV Substation	Yes	2015	2015	$2,824,664
NE	Thedford 345/115 kV Transformer	Yes	2016	2016	$9,306,000
NE	Humboldt 161/69 kV Ckt 1 Transformer	No		2018	$6,892,209
NE	Stuart - SW Holt 115 kV Ckt 1	No		2023	$29,512,930
NE	SW Holt 345 kV Substation	No		2023	$11,668,774
NE	SW Holt 345/115 kV Ckt 1 Transformer	No		2023	$10,516,124
NE	S1258 345/161 kV Ckt 1 Transformer	No		2023	$10,516,124
NE	Fullerton - PS24 115 kV Ckt 1	No		2023	$11,067,349
NM	Potash Junction 230/115 kV Ckt 1	Yes	2015	2015	$3,320,942
NM	Andrews 230/115 kV Ckt 1 Transformer	Yes	2015	2015	$9,503,243
NM	Hopi Sub - North Loving 115 kV Ckt 1	Yes	2015	2015	$10,718,511
NM	China Draw - North Loving 115 kV Ckt 1	Yes	2015	2015	$11,522,302
NM	Kiowa 345 kV Substation	Yes	2018	2018	$10,142,928
NM	Road Runner 345/115 kV Ckt 1 Transformer	Yes	2018	2018	$4,577,343
NM	Road Runner 345 kV Substation Conversion	Yes	2018	2018	$3,930,065
NM	Kiowa 345/230 kV Ckt 1 Transformer	Yes	2018	2018	$5,955,675
NM	Potash Junction - Road Runner 345 kV Ckt 1 Voltage Conversion	Yes	2018	2018	$7,097,576
NM	Hobbs - Kiowa 345 kV Ckt 1	Yes	2018	2018	$55,846,663
NM	China Draw - North Loving 345 kV Ckt 1	Yes	2018	2018	$18,290,178
NM	Kiowa - North Loving 345 kV Ckt 1	Yes	2018	2018	$23,457,538

State(s)	Upgrade Name	Issue NTC	50/50 Need Date	90/10 Need Date	Cost Estimate
NM	China Draw 345/115 kV Ckt 1 Transformer	Yes	2018	2018	$4,390,007
NM	North Loving 345/115 kV Ckt 1 Transformer	Yes	2018	2018	$5,583,339
NM	North Loving 345 kV Substation	Yes	2018	2018	$6,579,825
NM	Andrews - NEF 115 kV Ckt 1	Yes	2015	2015	$4,108,415
NM	China Draw - Wood Draw 115 kV Ckt 1	Yes	2018	2018	$12,688,747
NM	Livingston Ridge 115 kV Substation Conversion	Yes	2018	2018	$3,849,635
NM	Sage Brush 115 kV Substation	Yes	2018	2018	$4,007,502
NM	Livingston Ridge - Sage Brush 115 kV Ckt 1	Yes	2018	2018	$7,286,428
NM	Lagarto 115 kV Substation	Yes	2018	2018	$1,382,368
NM	Largarto - Sage Brush 115 kV Ckt 1	Yes	2018	2018	$5,827,378
NM	Cardinal 115 kV Substation	Yes	2018	2018	$6,351,568
NM	Cardinal - Lagarto 115 kV Ckt 1	Yes	2018	2018	$8,611,667
NM	North Loving - South Loving 115 kV Ckt 1	No	2015	2015	$6,928,199
NM	Artesia 115/69 kV Ckt 1 Transformer	No	2018	2018	$2,496,948
NM	Artesia 115/69 kV Ckt 2 Transformer	No	2018	2018	$2,496,948
NM	China Draw 115 kV SVC	No	2018	2018	$40,000,000
NM	Toboso Flats 115 kV SVC	No	2018	2018	$40,000,000
NM	Toboso Flats 115 kV Substation	No	2018	2018	$810,097
NM	Dollarhide - Toboso Flats 115 kV Ckt 1	No	2018	2018	$4,892,131
NM	China Draw - Yeso Hills 115 kV Ckt 1	No	2018	2018	$13,659,867
NM	Yeso Hills 115 kV Substation	No	2018	2018	$1,047,575
NM	Ponderosa 115 kV Substation	No	2018	2018	$997,575
NM	Ponderosa Tap 115 kV Substation	No	2018	2018	$4,071,449
NM	Ponderosa - Ponderosa Tap 115 kV Ckt 1	No	2018	2018	$4,727,414
NM	Battle Axe - Road Runner 115 kV Ckt 1	No	2018	2018	$12,574,305
NM	Battle Axe 115 kV Substation	No	2018	2018	$2,964,499
NM	Oxy South Hobbs 115 kV Substation	No	2018	2018	$308,657
NM	Potash Junction 345/115 kV Ckt 1 Transformer	No	2019	2019	$10,516,124
NM	Andrews - Cardinal 115	No	2021	2019	$8,853,879

State(s)	Upgrade Name	Issue NTC	50/50 Need Date	90/10 Need Date	Cost Estimate
	kV Ckt 1				
NM	Andrews 345/115 kV Ckt 1 Transformer	No	2022	2022	$10,516,124
NM	Andrews - Hobbs 345 kV Ckt 1 Voltage Conversion	No	2022	2022	$30,530,000
NM	Road Runner - Sage Brush 115 kV Ckt 1	No	2023	2023	$14,756,465
NM	Battle Axe - Wood Draw 115 kV Ckt 1	No	2023	2023	$11,067,349
NM	Livingston Ridge - IMC #1 Tap 115 kV Ckt 1 Reconductor	No	2023	2023	$4,351,605
NM	Intrepid West Tap- Potash Junction 115 kV Ckt 1 Reconductor	No	2023	2023	$693,867
NM	IMC #2 - Intrepid West Tap 115 kV Ckt 1 Reconductor	No	2023	2023	$1,787,512
NM	Curry 115 kV Load Move	No	2023	2023	
NM	Battle Axe - Road Runner 345 kV Ckt 1	No		2019	$19,625,305
NM	Battle Axe 345/115 kV Ckt 1 Transformer	No		2019	$10,516,124
NM	Dollarhide - South Jal Sub 115 kV Ckt 1 Reconductor	No		2023	$1,700,205
NM	Ochoa - Ponderosa Tap 115 kV Ckt 1 Reconductor	No		2023	$4,161,825
NM	Ponderosa Tap - Whitten 115 kV Ckt 1 Reconductor	No		2023	$2,717,111
NM	Potash Junction 345/115 kV Ckt 2 Transformer	No		2019	$10,516,124
OK	Darlington - Roman Nose 138 kV Ckt 1	Yes	2015	2015	$26,416,440
OK	Darlington - Red Rock 138 kV Ckt 1	Yes	2015	2015	$15,277,233
OK	Grady - Round Creek 138 kV Ckt 1	Yes	2015	2015	$12,132,497
OK	Grady - Phillips 138 kV Ckt 1 & 2	Yes	2015	2015	$8,318,584
OK	Stonewall - Wapanucka 138 kV Ckt 1	No	2015	2015	$8,934,149
OK	Ellis 138 kV Substation	No	2015	2015	$4,100,000
OK	Carmen 138/69 kV Ckt 1 Transformer	Yes	2016	2016	$2,810,198
OK	Cherokee Junction Tap 138/69 kV Ckt 1 Transformer	Yes	2016	2016	$2,810,198
OK	Carmen - Cherokee Junction 69 kV Ckt 1 Rebuild	Yes	2016	2016	$10,505,465
OK	Cherokee Junction Tap 138 kV Substation	Yes	2016	2016	$4,100,000

State(s)	Upgrade Name	Issue NTC	50/50 Need Date	90/10 Need Date	Cost Estimate
OK	SW Station - Warwick Tap 138 kV Ckt 1	Yes	2018	2018	$28,572,000
OK	Linwood - SW Station 138 kV Ckt 1	Yes	2018	2018	N/A
OK	Knipe - SW Station 138 kV Ckt 1	Yes	2018	2018	N/A
OK	Elk City 138/69 kV Ckt 1 Transformer	No*	2017	2017	$2,810,198
OK	Bufbear 138 kV Sub Conversion	No	2018	2015	
OK	Buffalo 138/69 kV Ckt 1 Transformer	No	2018	2015	$2,810,198
OK	Bufbear - Ft. Supply 138 kV Ckt 1 Rebuild	No	2018	2015	$13,246,021
OK	Bufbear - Buffalo 138 kV Ckt 1 Rebuild	No	2018	2015	$2,968,936
OK	Mooreland - Woodward District EHV 345 kV Ckt 1	No	2018	2018	$13,083,537
OK	Byron - Medlodge 138 kV Ckt 1 Rebuild	No	2021	2021	$6,303,279
OK	Hazelton - Medlodge 138 kV Ckt 1 Rebuild	No	2021	2021	$11,510,336
OK	Border - Chisholm 345 kV Ckt 1	No	2021	2021	$654,177
OK	Chisholm - Woodward District EHV 345 kV Ckt 1	No	2021	2021	$654,177
OK	Chisholm 345/230 kV Ckt 2 Transformer	No	2021	2021	$10,516,124
OK	Clyde - Grant County 138 kV Ckt 1 Rebuild	No	2023	2023	$8,175,993
OK	Clyde - Four Corners 138 kV Ckt 1 Reconductor	No	2023	2018	$5,625,708
OK	Four Corners - Kremlin 138 kV Ckt 1 Reconductor	No	2023	2018	$4,511,762
OK	Kremlin - NE Enid 138 kV Ckt 1 Rebuild	No	2023	2023	$7,262,474
OK	Bartlesville Commanche - Mound Road 138 kV Ckt 1 Rebuild	No		2015	$2,557,852
OK	Keystone - Wekiwa 69 kV Ckt 1 Rebuild	No		2023	$1,827,037
TX	Allen Substation – Lubbock South Interchange 115 kV Ckt 1 Rebuild	No	2019	2019	$4,786,717
TX	Mustang - Shell CO2 115 kV Ckt 1	Yes	2015	2015	$16,770,522
TX	Hereford 115/69 kV Ckt 1 Transformer	No	2018	2018	$2,496,948
TX	Hereford 115/69 kV Ckt 2 Transformer	No	2018	2018	$2,496,948
TX	Hale County - Tuco 115 kV Ckt 1 Reconductor	No	2018	2018	$9,415,457

State(s)	Upgrade Name	Issue NTC	50/50 Need Date	90/10 Need Date	Cost Estimate
TX	Bowers - Grapevine 115 kV Reconductor	No	2019	2019	$1,796,703
TX	Hitchland 230/115 kV Ckt 2 Transformer	No	2023	2023	$6,020,434
TX	Carlisle 230/115kV Ckt 1 Transformer	No	2023	2023	$6,020,434
TX	Sundown - Wolfforth 230 kV Ckt 1 Reconductor	No	2023	2023	$22,580,725
TX	Sundown 230/115 kV Ckt 2 Transformer	No	2023	2023	$6,020,434
TX	Plant X 230/115 kV Ckt 2 Transformer	No	2023	2023	$6,020,434
TX	Seminole 230/115 kV Ckt 1 Transformer	No	2023	2023	$6,020,434
TX	Seminole 230/115 kV Ckt 2 Transformer	No	2023	2023	$6,020,434
TX	Wolfforth 230/115 kV Ckt 1 Transformer	No	2023	2023	$6,020,434
TX	Deaf Smith - Hereford 115 kV Ckt 2 Reconductor	No	2023	2023	$997,147
TX	Puckett - Soncy Tap 115 kV Ckt 1 Reconductor	No	2023	2023	$326,255
TX	Coulter - Puckett 115 kV Ckt 1 Reconductor	No	2023	2023	$1,056,884
TX	Northwest - Rolling Hills 115 kV Reconductor Ckt 1	No	2023	2023	$3,832,353
TX	Bowers 115 kV Load Move	No	2023	2023	
TX	Vickers 115 kV Load Move	No	2023	2023	
TX	Carlisle - Doud Tap 115 kV Ckt 1 Reconductor	No	2023	2023	$1,148,787
TX	Doud - Doud Tap 115 kV Ckt 1 Reconductor	No	2023	2023	$781,175
TX	Doud Tap - Wolf Tap 115 kV Ckt 1 Reconductor	No	2023	2023	$643,321
TX	Wolf Tap - Yuma 115 kV Ckt 1 Reconductor	No	2023	2023	$367,612
TX	Center 345/138 kV Ckt 1 Transformer	No		2023	$10,516,124
TX	McLean - Wheeler 115 kV Ckt 1	No		2023	$25,823,814
TX	Lubbock South - Woodrow 115 kV Ckt 1 Reconductor	No		2023	$2,747,898
TX	Rockhill 138/69 kV Ckt 2 Transformer	No		2023	$2,810,198
TX/LA	Center - Dolet Hills 345 kV Ckt 1	No		2023	$58,875,915
NM	Potash Junction - Road Runner 230 kV Ckt 1	NTC-C Modify	2015	2015	$3,491,968
NM	Road Runner 230/115 kV Substation	NTC-C Modify	2015	2015	$2,107,123
NM	Hobbs 345/230 kV	NTC-C	2018	2018	$10,262,813

State(s)	Upgrade Name	Issue NTC	50/50 Need Date	90/10 Need Date	Cost Estimate
	Transformer Ckt 1	Modify			
TX	Yoakum 345/230 kV Ckt 1 Transformer	NTC-C Modify	2020	2020	$4,929,607
TX	Tuco - Yoakum 345 kV Ckt 1	NTC-C Modify	2020	2020	$160,991,967
TX/NM	Hobbs - Yoakum 345 kV Ckt 1	NTC-C Modify	2020	2020	$69,907,711

* An alternate solution for this project will be evaluated through the ITP10/ITPNT process.

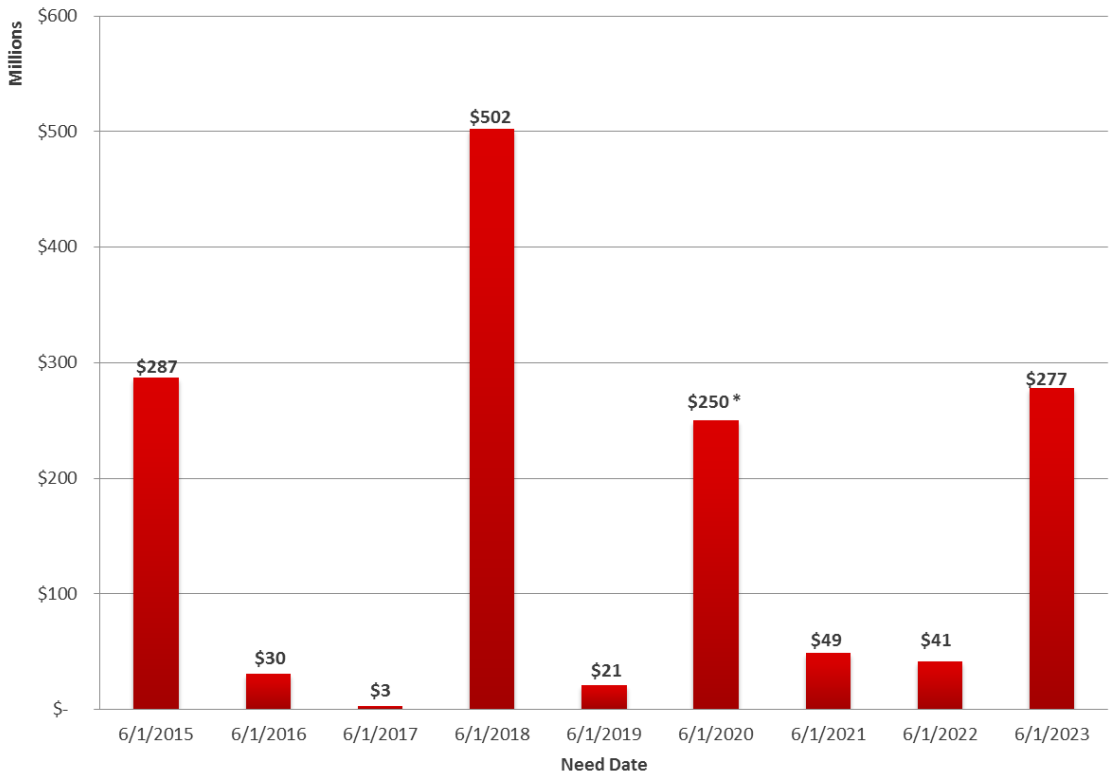
** Clark County transformer cost was based on SPP conceptual cost estimates.

Table 9.1: Major Projects in the HPILS Portfolio

9.3 Staging Considerations

Section 6.6 Reliability Project Staging describes the procedure used to stage the projects in the HPILS Portfolio. In addition to this procedure, special considerations were given to these projects as the portfolio was refined with stakeholder input. The need dates for all of the projects can be found in Appendix C. The total project costs by need by date are shown in Figure 9.2.

Note that the total projects costs in each need year are based on a combination of conceptual SPP calculated cost estimates and SCERTs provided by the Stakeholders.



*$238 M is associated with the modified NTC-C

Figure 9.2: HPILS Portfolio Costs by Need by Year ($ millions)

9.4 HPILS Projects Recommended for NTCs

The HPILS TF determined the criteria for the selection of projects in the HPILS Portfolio that should receive new NTCs. The criteria is as described below.

NTCs should be issued for those reliability projects with need dates through 2017, as well as projects requiring a financial commitment prior to August 2015. The August 2015 reference is significant because that is expected to be the earliest start for reliability projects not needed within three years resulting from 2015 ITP10 and ITPNT study processes due to the Order 1000 compliant competitive environment that will exist then.

Based on the selection criteria, NTCs are recommended for the projects listed in Table 9.2 by project location (state). Note that the transmission projects required only for load connections that would be recommended for NTCs (a total of $327 M) are not listed in Table 9.2 but are provided in Appendix A.

State(s)	Upgrade Name	Project Lead Time (Months)	50/50 Year	90/10 Year	Cost Estimate
KS	Kansas Avenue - Dobson - Gano 115 kV Ckt 1 Terminal Upgrades	24	2015	2015	$134,366
KS	Garden City - Kansas Avenue 115 kV Ckt 1 Terminal Upgrades	12	2015	2015	$124,484
KS	Ashland - Coldwater Tap 115 kV Ckt 1	36	2018	2018	$21,596,406
KS	Ashland - Clark Tap 115 kV Ckt 1	36	2018	2018	$21,963,871
KS	Anthony - Harper 138 kV Ckt 1	36	2018	2015	$20,992,491
NE	Spalding 115 kV Cap Bank	12	2015	2015	$600,000
NE	Thedford 345/115 kV Transformer	48	2016	2016	$9,306,000
NE	Thedford 345 kV Terminal Upgrades	48	2016	2016	$930,800
NM	Eagle Creek 115 kV Cap Bank	12	2015	2015	$1,360,435
NM	Potash Junction 230/115 kV Ckt 1	24	2015	2015	$3,320,942
NM	Andrews 230/115 kV Ckt 1 Transformer	24	2015	2015	$9,503,243
NM	Hobbs - Kiowa 345 kV Ckt 1	48	2018	2018	$55,846,663
NM	Andrews - NEF 115 kV Ckt 1	36	2015	2015	$4,108,415
OK	Darlington - Roman Nose 138 kV Ckt 1	36	2015	2015	$26,416,440
OK	Alva OGE 69 kV Terminal Upgrades	12	2015	2015	$180,000
OK	Jenson - Jenson Tap 138 kV Ckt 1 Terminal Upgrades	12	2015	2015	$0
OK	Freedom 69 kV Cap Bank	18	2015	2015	$125,000
OK	Carmen - Eagle Chief 69 kV Ckt 1 Reconductor	24	2015	2015	$3,492,160
OK	Eagle Chief 69 kV Cap Bank	18	2015	2015	$190,000
OK	Carmen 138 kV Ckt 1Terminal Upgrades	24	2016	2016	
OK	Carmen 138/69 kV Ckt 1 Transformer	24	2016	2016	$2,810,198
OK	Cherokee Junction Tap 138/69 kV Ckt 1 Transformer	24	2016	2016	$2,810,198

State(s)	Upgrade Name	Project Lead Time (Months)	50/50 Year	90/10 Year	Cost Estimate
OK	Carmen - Cherokee Junction 69 kV Ckt 1 Rebuild	24	2016	2016	$10,505,465
OK	Cherokee Junction Tap 138 kV Substation	24	2016	2016	$4,100,000
OK	SW Station - Warwick Tap 138 kV Ckt 1	36	2018	2018	$28,572,000
OK	Linwood - SW Station 138 kV Ckt 1	36	2018	2018	N/A
OK	Knipe - SW Station 138 kV Ckt 1	36	2018	2018	N/A
TX	Mustang - Shell CO2 115 kV Ckt 1	36	2015	2015	$16,770,522

Table 9.2: New NTC (Excludes Projects for Load Connection) Projects in the HPILS Portfolio

Figure 9.3 shows the total cost of New NTC projects by state including the transmission projects needed for load connection.

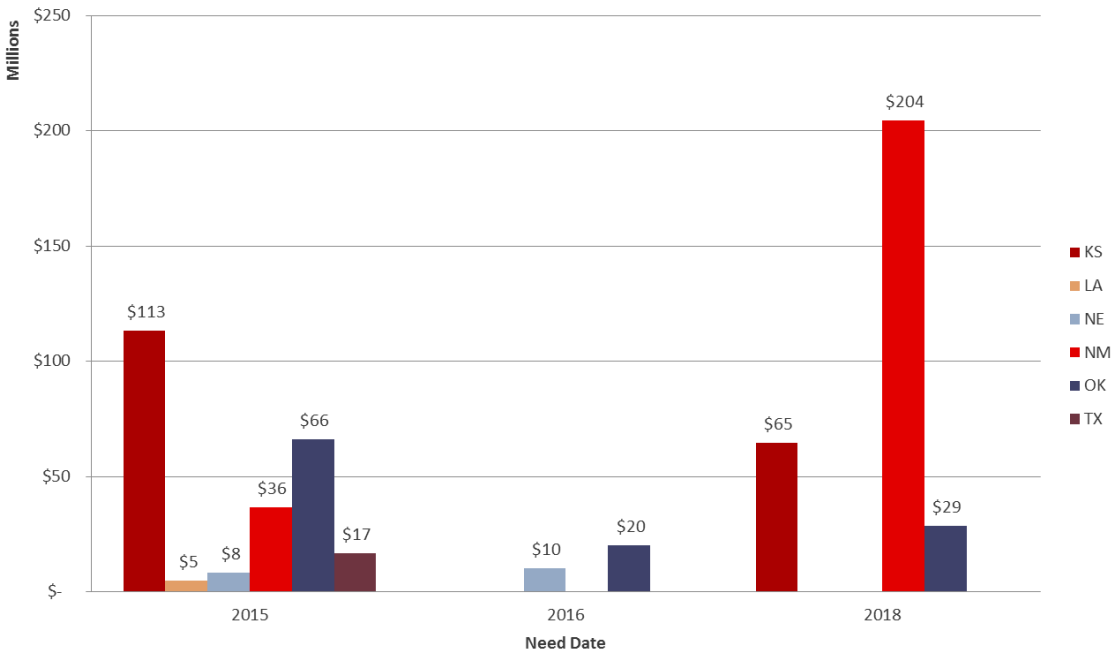


Figure 9.3: Project NTC Costs by Need by Year and Location ($ millions)

9.5 Mitigation Plans

Based on estimated lead times for HPILS NTC projects and targeted need dates, there are some reliability needs that will require mitigation. For those reliability needs directly related to interconnection of new load, mitigation will consist of simply not connecting the load until the requisite project is in service.

All HPILS NTC projects will be subject to the project tracking process defined in SPP OATT Business Practice 7060. SPP requires a mitigation plan to be filed by the designated TO if the in-service date of a project is anticipated to be beyond the Need Date established on the NTC. All mitigation plans must be received within 60 calendar days from the determination of the delay.

9.6 Cost Allocation and Rate Impacts of HPILS Projects

All projects issued NTCs as a result of the HPILS will be considered Base Plan Upgrades and subject to the Highway Byway cost allocation methodology described in Attachment J of the SPP Open Access Transmission Tariff (OATT). Highway Byway cost allocation is determined by the voltage of the facility. The higher the voltage, the higher the percentage of the Regional recovery of the facility's Annual Transmission Revenue Requirement (ATRR) as shown in **Error! Reference source not found.** below.

Voltage	Regional	Zonal
300 kV and Above	100%	0%
100 kV – 299 kV	33%	67%
Below 100 kV	0%	100%

Table 9.3: Highway Byway Ratemaking

The following inputs and assumptions were required to cost allocate HPILS upgrades:

- Total investment of each upgrade as estimated in today's dollar
  - 2.5% Construction Price Inflation was applied
- Transmission Owner's estimated individual annual carrying charge %
- Voltage level of each upgrade
- In-service year of each upgrade
- 2.5% annual straight line rate base depreciation, year on year
- Mid-year convention for facilities going into rates
- SPP Pricing Zone per OATT Attachment H, Table 1 (Zone) of each HPILS incremental upgrade.

Figure 9.4, below, shows the ATRR allocated to each Zone from the incremental HPILS upgrades.

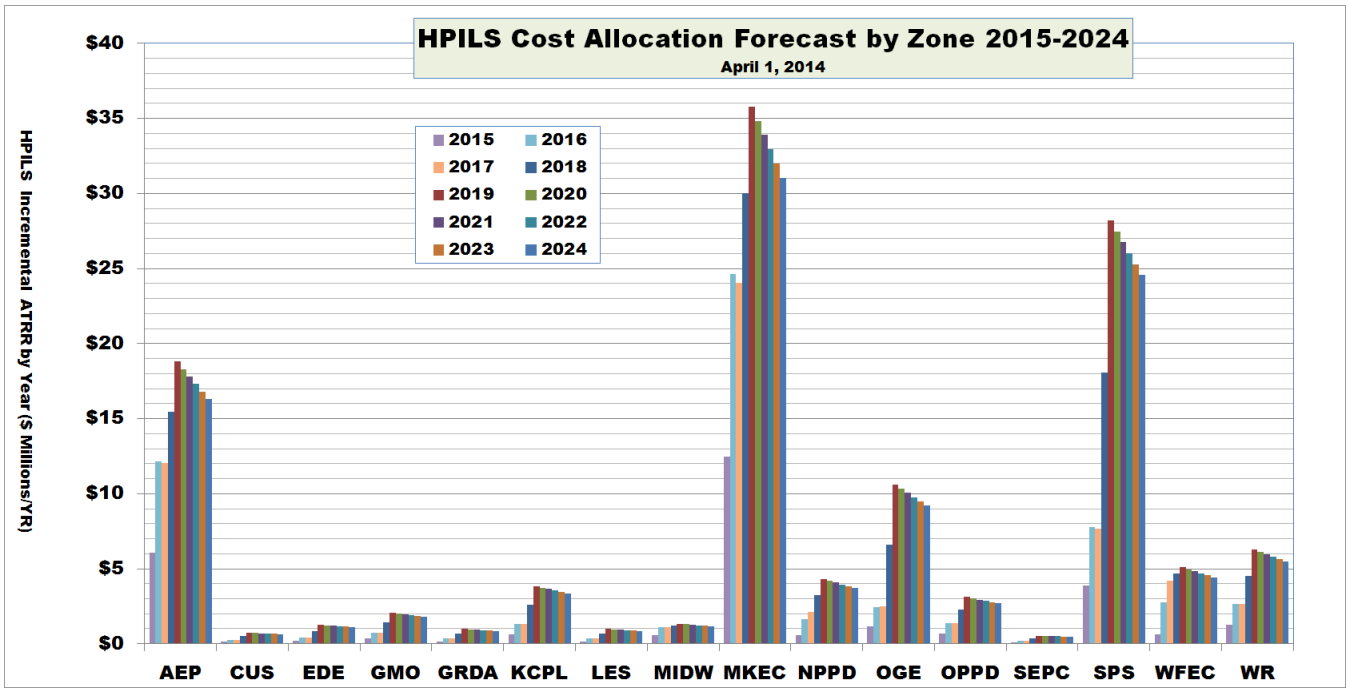


Figure 9.4*: HPILS Cost Allocation Forecast by SPP Pricing Zone*

The SPP OATT also requires that a "Rate Impact Analysis" be performed for each Integrated Transmission Plan (ITP) per Attachment O: Transmission Planning Process, Section III: Integrated Transmission Planning Process, Sub-Section 8.

The rate impact analysis process was developed under the direction of the Regional State Committee in 2010-2011 by the Rate Impact Task Force (RITF). The RITF developed a methodology that estimates the monthly electric bill impact to a typical Retail Residential customer of each Zone. Zones performed a general update of their specific inputs in December of 2013.

The ATRR of the peak year of 2019 is allocated to the Retail Rate by the individual Zone's customer class allocation percentage. This value is then divided by the sales forecast in the peak year (the billing determinant) to determine the change in the rate due to HPILS incremental upgrades. This rate is then multiplied by a typical SPP monthly Retail Residential consumption of 1000 kWh per month.

The Rate Impact was determined for costs only. Offsetting benefits were not included.

The result is the monthly Rate Impact[15] as shown in Figure 9.5.

[15] http://www.spp.org/publications/RITF%20Output%20for%20RSC%20Jan%2024%202011%20REV%204.ppt

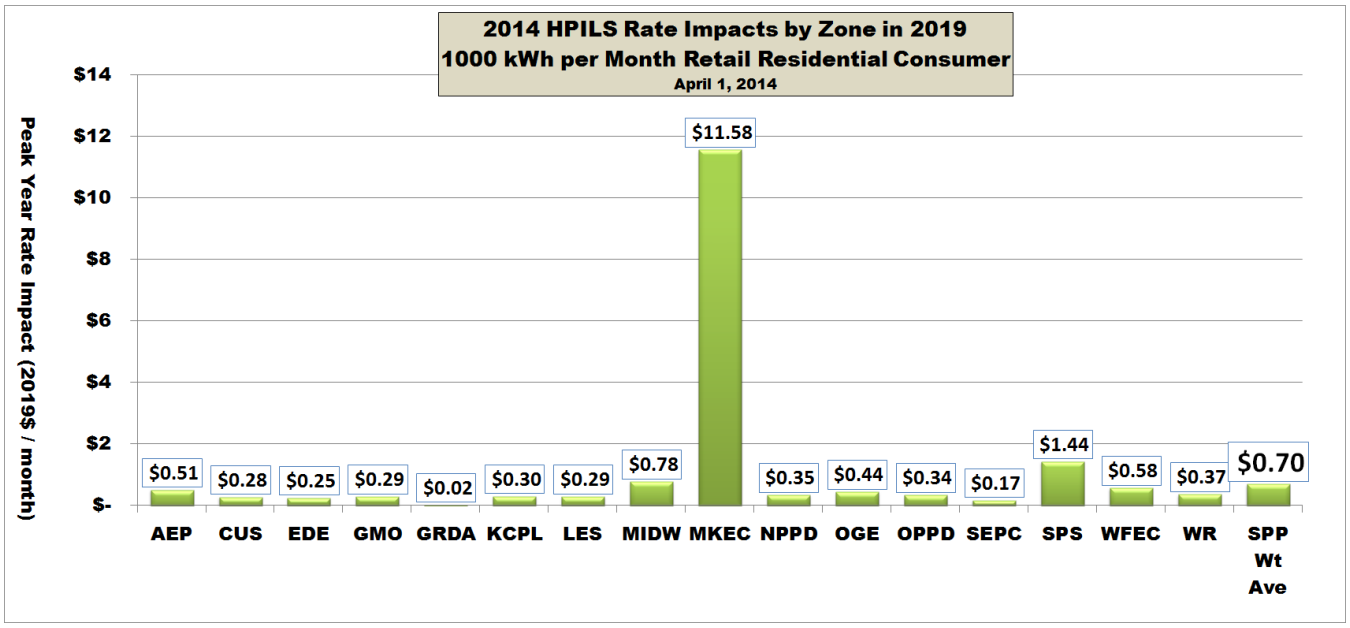


Figure 9.5: Monthly Rate Impact

10 Benefit Metric and 40-Year Financial Analysis

The final incremental benefit metric was calculated on the recommended, modified NTC-C of Tuco-Yoakum-Hobbs 345kV in 2020 and 2023 for the 50/50 scenario. The year 2018 was used as a proxy for the need year (2020) of the reliability alternative. The benefit of 1-year and 40-year APC savings were developed for this study.

10.1 Benefits Reported on a Portfolio Basis

The incremental benefits regarding TYH as part of the recommended portfolio were calculated based on the APC delta between the change case and base case. The change case includes the list of recommended HPILS portfolio projects and those projects identified in both the HPILS and 2014 ITPNT studies. The base case includes the same projects but excludes the projects associated with the TYH 345 kV alternative. The incremental benefits as reported are based on the delta in SPP footprint APC.

10.2 APC Savings

10.2.1 One-Year APC Savings

The information shown in Table 10.1 pertains only to the referenced study years and does not include the full benefits expected over the life of the projects. The values in the table represent the APC savings expected from adding TYH to the HPILS portfolio.

	2020*	2023
Incremental Benefit	$6.8	$16.3

*2020 values interpolated from 2018 and 2023 data points

Table 10.1: One-Year APC Savings for SPP Resulting from TYH ($ millions)

10.2.2 Forty-Year Financial Analysis

To calculate the benefits over the expected 40-year life of the alternative, two years were analyzed, 2018 and 2023, and the APC savings calculated. To determine the annual growth for each of the 40 years, the slope between the two points was used to extrapolate the benefits for every year beyond 2023 over a 40-year timeframe beginning in 2020. Benefits were assumed to remain constant at the year 20 value for years 21 through 40 of the analysis. Each year's benefit was then discounted using an 8% discount rate. The sum of all discounted benefits was presented as the Net Present Value (NPV) benefit. This calculation was performed for every zone.

The zonal, state, and regional benefits for the selected West Texas/New Mexico reliability alternative are shown in Table 10.2 and Table 10.3 as an APC Delta, negative numbers indicating positive benefit. Note that for these benefits, the Independent Power Producers (IPPs) and SWPA zones are excluded from the benefit values.

Zone	NPV APC Delta
AEPW	$37.2
EMDE	($0.5)
GMO	$5.9
GRDA	$8.1
KCPL	$2.8
LES	$1.9
MIDW	($13.6)
MKEC	$13.6
NPPD	$0.9
OKGE	$74.0
OPPD	$5.0
SPCIUT	($17.6)
SUNC	($4.4)
SWPS	($533.4)
WFEC	($6.9)
WRI	$17.9
Total	**($409.1)**

Table 10.2: Forty-Year Zonal APC Delta

State	NPV APC Delta (*$Millions)*
Arkansas	$14.9
Kansas	$10.2
Louisiana	$3.5
Missouri	($6.2)
Nebraska	$7.8
New Mexico	($400.4)
Oklahoma	$96.0
Texas	($135.1)
Total	**($409.1)**

Table 10.3: Forty-Year State APC Delta

10.2.3 Benefits of Reliability Projects

Consistent with prior ITP assessments, it is assumed that the reliability projects for HPILS provide a 1.0 B/C ratio. As a result, the projected $573 M in new NTC reliability projects would be estimated to provide benefits of $573 M.

11 Conclusion

The HPILS Portfolio is a set of projects that are expected to meet the projected reliability needs under the 50/50 load forecast scenarios for the horizon ending in 2023. The portfolio outlines transmission that proved flexible enough to meet the criteria requirements in a cost effective manner and provide economic value.

The projects in the portfolio were studied through an iterative process to reduce the scale of the transmission development. The assessment utilized a diverse array of power system and economic analysis tools to evaluate the need for transmission projects that satisfy needs such as:

a) resolving potential criteria violations;
b) mitigating known or foreseen congestion;
c) improving access to markets; and
d) staging transmission expansion;

Confidence in the findings of the study was encouraged through the use of multiple assessment methodologies that evaluated the system from different perspectives and included a comprehensive review by the HPILS Task Force and the respective member areas. This brought about thorough vetting of each project. Study tools and drivers were successfully benchmarked against historical expectations and cost estimates were developed using stakeholder provided cost estimates (SCERTS) as well as typical per unit cost estimate values.

Continuous feedback concerning the technical details of needs identified in the system, the study findings and projects selected were consistent with the requirements outlined in the approved HPILS scope of work.

Stakeholders provided review, direction, technical expertise, and project suggestions throughout the study process. Multiple meetings, teleconferences, and communications exchanged provided transparency and ensured both regional and local considerations were taken into account.

11.1 HPILS by the numbers

Project need dates were identified as well as the anticipated project financial commitment start dates. This information was used to implement the selection of projects for NTCs. Based on the HPILS Task Force approval, recommendations for NTCs issuance were based on reliability projects with need dates through 2017, as well as projects needing a financial commitment prior to July 2015 which would be the earliest start for projects resulting from 2015 ITP10 study process.

Figure 11.1 shows a staging of the projects with a magnitude of the expected project costs by need date. The cost of the HPILS Portfolio[16] was estimated at $1.5 B (billion), $573 M (million) of which are recommended to receive new NTCs. The re-evaluated and recommended Tuco-Yoakum-Hobbs solution for the West Texas/New Mexico area was estimated at $238 M. The HPILS Portfolio only includes the projects required to meet the 50/50 load forecasts.

[16] Note that this only included project needed for the 50/50 load forecast

The HPILS assessment also included the evaluation of the following suspended NTC-Cs with the following conclusions:

1. **Tuco to New Deal 345 kV:** No reliability or economic need was identified for this project. Therefore, the Tuco to New Deal 345 kV was not evaluated in the HPILS process.

2. **Grassland to Wolfforth 230 kV line:** This project was identified as a possible reliability solution to address the overloads observed near Lubbock area in the 2023 scenarios. However, based on the final HPILS Portfolio, this project was not required to meet reliability criteria outlined in the HPILS scope.

3. **Tuco to Amoco to Hobbs (TAH) 345 kV line:** This project was identified as one of three possible reliability solutions needed to provide a 345 kV source into the New Mexico area load pocket. However the Tuco - Yoakum - Hobbs 345 kV line was selected over the TAH option because it provided higher economic value with higher benefits and lower installed costs.

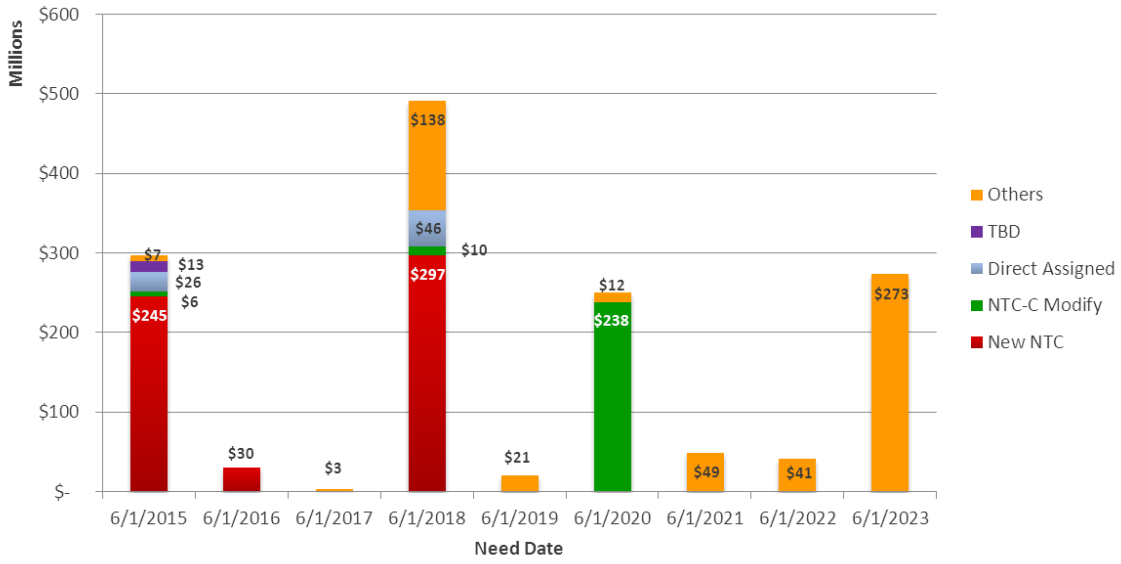


Figure 11.1: HPILS Portfolio Costs by Need Year ($ millions)

"New NTC" represents projects that did not previously have an NTC issued that were identified in the HPILS process. "NTC-C Modify" represents projects with previously issued or suspended NTC-Cs that were modified or accelerated in the HPILS/ITPNT process.

NTCs will be issued for all projects shown below as new NTC and NTC-C Modify, as well as projects designated as being Direct Assigned. Projects with new NTC and NTC-C Modify will be Base Plan funded. Projects shown as TBD (To Be Determined) are uncertain. Projects in the Others category are part of the HPILS Portfolio which did not need immediate commitment and can be re-evaluated in future ITP studies.

An incremental $285 million of projects were developed to reliably serve the incremental 90/10 load forecasts as shown in Figure 11.2 below.

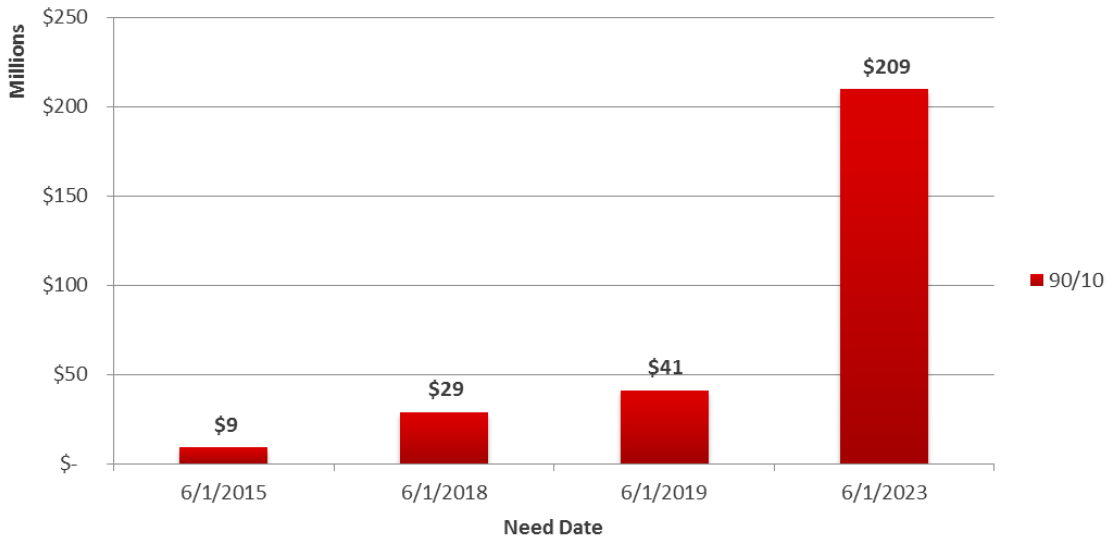


Figure 11.2: Incremental HPILS 90/10 Project Costs by Need Year ($ millions)

The 230 kV and above projects listed in Table 11.1 below make up the greater part of the HPILS Portfolio. The complete list of projects included in the HPILS Portfolio can be found in Appendix C.

State(s)	Upgrade Name	Issue NTC	50/50 Need Year	90/10 Need Year	Cost Estimate
KS	Clark Co. 345/115 kV Ckt 1 Transformer	Yes	2015	2015	$10,516,124
NE	Thedford 345/115 kV Transformer	Yes	2016	2016	$9,306,000
NE	Thedford 345 kV Terminal Upgrades	Yes	2016	2016	$930,800
NM	Potash Junction 230/115 kV Ckt 1	Yes	2015	2015	$3,320,942
NM	Andrews 230/115 kV Ckt 1 Transformer	Yes	2015	2015	$9,503,243
NM	Kiowa 345 kV Substation	Yes	2018	2018	$10,142,928
NM	Road Runner 345/115 kV Ckt 1 Transformer	Yes	2018	2018	$4,577,343
NM	Road Runner 345 kV Substation Conversion	Yes	2018	2018	$3,930,065
NM	Kiowa 345/230 kV Ckt 1 Transformer	Yes	2018	2018	$5,955,675
NM	Potash Junction - Road Runner 345 kV Ckt 1 Voltage Conversion	Yes	2018	2018	$7,097,576
NM	Hobbs - Kiowa 345 kV Ckt 1	Yes	2018	2018	$55,846,663
NM	China Draw - North Loving 345 kV Ckt 1	Yes	2018	2018	$18,290,178
NM	Kiowa - North Loving 345 kV Ckt 1	Yes	2018	2018	$23,457,538
NM	China Draw 345/115 kV Ckt 1	Yes	2018	2018	$4,390,007

State(s)	Upgrade Name	Issue NTC	50/50 Need Year	90/10 Need Year	Cost Estimate
	Transformer				
NM	China Draw 345 kV Ckt 1 Terminal Upgrades #1	Yes	2018	2018	$4,318,803
NM	North Loving 345/115 kV Ckt 1 Transformer	Yes	2018	2018	$5,583,339
NM	North Loving 345 kV Substation	Yes	2018	2018	$6,579,825
LA	Benteler - McDade 345 kV Ckt 1	No	2023	2018	$13,083,537
LA	McDade 345/138 kV Ckt 1 Transformer	No	2023	2018	$10,516,124
LA	Messick 500/345 kV Ckt 1 Transformer	No	2023	2018	$19,718,950
LA	McDade - Messick 345 kV Ckt 1	No	2023	2018	$45,792,379
LA	Benteler 345/138 kV Ckt 1 Transformer	No	2023	2018	$10,516,124
NM	Potash Junction 345/115 kV Ckt 1 Transformer	No	2019	2019	$10,516,124
NM	Andrews 345/115 kV Ckt 1 Transformer	No	2022	2022	$10,516,124
NM	Andrews - Hobbs 345 kV Ckt 1 Voltage Conversion	No	2022	2022	$30,530,000
NM	Oasis - Roosevelt County Interchange Switch 115 kV Ckt 1 Terminal Upgrades	No	2023	2023	
OK	Mooreland - Woodward District EHV 345 kV Ckt 1	No	2018	2018	$13,083,537
OK	Border - Chisholm 345 kV Ckt 1	No	2021	2021	$654,177
OK	Chisholm - Woodward District EHV 345 kV Ckt 1	No	2021	2021	$654,177
OK	Chisholm 345/230 kV Ckt 2 Transformer	No	2021	2021	$10,516,124
TX	Hitchland 230/115 kV Ckt 2 Transformer	No	2023	2023	$6,020,434
TX	Carlisle 230/115kV Ckt 1 Transformer	No	2023	2023	$6,020,434
TX	Sundown - Wolfforth 230 kV Ckt 1 Reconductor	No	2023	2023	$22,580,725
TX	Sundown 230/115 kV Ckt 2 Transformer	No	2023	2023	$6,020,434
TX	Lubbock South - Wolfforth 230 kV Ckt 1 Terminal Upgrades	No	2023	2023	
TX	Plant X 230/115 kV Ckt 2 Transformer	No	2023	2023	$6,020,434
TX	Seminole 230/115 kV Ckt 1 Transformer	No	2023	2023	$6,020,434
TX	Seminole 230/115 kV Ckt 2 Transformer	No	2023	2023	$6,020,434
TX	Wolfforth 230/115 kV Ckt 1 Transformer	No	2023	2023	$6,020,434
TX	Yoakum 345/230 kV Ckt 1 Transformer	NTC-C Modify	2020	2020	$4,929,607
TX	Yoakum 345 kV Ckt 1 Terminal Upgrades	NTC-C Modify	2020	2020	$1,714,283
TX	Tuco - Yoakum 345 kV Ckt 1	NTC-C Modify	2020	2020	$160,991,967
TX/NM	Hobbs - Yoakum 345 kV Ckt 1	NTC-C	2020	2020	$69,907,711

State(s)	Upgrade Name	Issue NTC	50/50 Need Year	90/10 Need Year	Cost Estimate
		Modify			
NM	Potash Junction - Road Runner 230 kV Ckt 1	NTC-C Modify	2015	2015	$3,491,968
NM	Road Runner 230/115 kV Substation	NTC-C Modify	2015	2015	$2,107,123
NM	Hobbs 345/230 kV Transformer Ckt 1	NTC-C Modify	2018	2018	$10,262,813

Table 11.1: Final Reliability Projects 230 kV and above for TYH option in the HPILS Portfolio

Figure 11.3 shows the 100 kV and above projects included in the HPILS Portfolio for the TYH solution option.

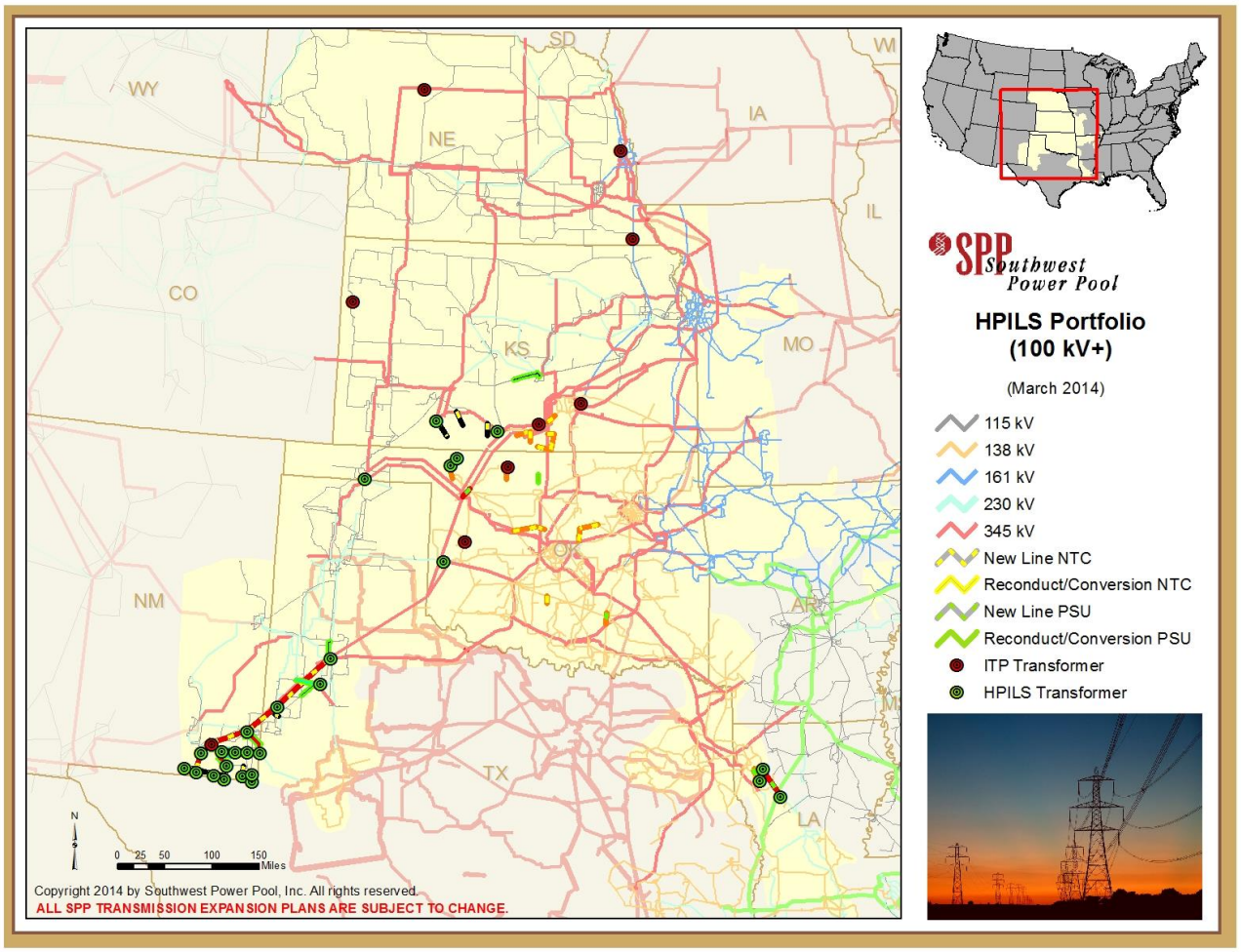


Figure 11.3: Finalized HPILS Portfolio (100 kV and above)

PART IV: APPENDICES

Appendix A: Transmission Needed for Load Connection

Requested BOD Action	State(s)	Upgrade Name	Project Description/Comments	Issue NTC	Project Lead Time (Months)	50/50 Project Start Year	50/50 Year	90/10 Year	Cost Estimate	Cost Estimate Source	From Bus Number	From Bus Name	To Bus Number	To Bus Name	Circuit	Voltages (kV)	Cost Allocation Voltage (kV)	Miles of New	Miles of Reconductor /Rebuild	Miles of Voltage Conversion	Rating
NTC	KS	Harper - Rago 138 kV Ckt 1	Construct new 15-mile 138 kV line from Harper to new Rago substation.	Yes	36	2012	2015	2015	$13,666,262	MKEC	539668	HARPER 4	539017	RAGO	1	138	138	15			190/190
NTC	KS	Clark Tap - Minneola 115 kV Ckt 1	Construct new 7.5-mile 115 kV line from Clark Tap to Minneola.	Yes	36	2012	2015	2015	$6,602,085	MKEC	539052	CLARK_TP	539037	MINNEOLA	1	115	115	7.5			160/160
NTC	KS	Midwest Pump Tap 115 kV Substation	Tap existing 115 kV line from Kanarado (Sunflower) to Sharon Springs to construct new Midwest Pump Tap substation.	Yes	36	2012	2015	2015	$4,100,000	SPP	530700	MWPMPTP				115	115				
NTC	LA	Benteler - Port Robson 138 kV Ckt 1	Build 138 kV line from Benteler to Port Robson (circuit 1).	Yes	36	2012	2015	2015	$2,248,743	SPP	507792	BENTELER	507782	PROBSON4	1	138	138	3			344/500
NTC	LA	Benteler - Port Robson 138 kV Ckt 2	Build 138 kV line from Benteler to Port Robson (circuit 2).	Yes	36	2012	2015	2015	$2,548,575	SPP	507792	BENTELER	507782	PROBSON4	2	138	138	3.4			344/500
NTC	NE	S1260 161 kV Substation	Tap existing 161 kV line from S1259 to S1281 to construct new S1260 substation.	Yes	24	2013	2015	2015	$4,636,045	OPPD	646260	S1260 5				161	161				
NTC	NE	S1398 161 kV Substation	Tap existing 161 kV line from Humboldt to S1399 to construct new S1398 substation.	Yes	24	2013	2015	2015	$2,824,664	OPPD	646398	S1398 5				161	161				
NTC	NM	Hopi Sub - North Loving 115 kV Ckt 1	Construct new 9.5-mile 115 kV line from Hopi Sub to North Loving 115 kV.	Yes	36	2012	2015	2015	$10,718,511	SPS	528226	HOPI_SUB 3	528182	NORTH_LOVNG3	1	115	115	9.5			276/304
NTC	NM	China Draw - North Loving 115 kV Ckt 1	Construct new 19.7-mile 115 kV line from North Loving to China Draw.	Yes	36	2012	2015	2015	$11,522,302	SPS	528182	NORTH_LOVNG3	528222	CHINA_DRAW 3	1	115	115	19.7			276/304
NTC	NM	China Draw - Wood Draw 115 kV Ckt 1	Construct new 14-mile 115 kV line from China Draw to Wood Draw.	Yes	36	2015	2018	2018	$12,688,747	SPS	528222	CHINA_DRAW 3	528228	WOOD_DRAW 3	1	115	115	14			276/304
NTC	OK	Darlington - Red Rock 138 kV Ckt 1	Construct new 8-mile 138 kV line from Red Rock to Darlington.	Yes	36	2012	2015	2015	$15,277,233	AEP	511548	REDROCKRD4	511559	DARLINGTNRD4	1	138	138	8			322/484
NTC	OK	Grady - Round Creek 138 kV Ckt 1	Construct new Round Creek box bay tap structure adjacent to the Rush Springs 138 kV substation. Construct new 6-mile 138 kV line from Grady to Round Creek. Install 3-breaker ring bus where hard tap to Round Creek intersects the Cornville to Duncan 138 kV transmission line.	Yes	36	2012	2015	2015	$12,132,497	AEP	511560	GRADY4	511427	RUSHNG 4	1	138	138	6			278/316
NTC	OK	Grady - Phillips 138 kV Ckt 1 & 2	Construct new 4-mile double circuit 138 kV line from the new 4-breaker ring bus station at Grady. Circuit 1 will terminate at Phillips Gas and Circuit 2 will terminate at Lindsey Water Flood.	Yes	36	2012	2015	2015	$8,318,584	AEP	511514	PHILPS 4	511560	GRADY4	1	138	138	4			278/316

Requested BOD Action	State(s)	Upgrade Name	Project Description/Comments	Issue NTC	Project Lead Time (Months)	50/50 Project Start Year	50/50 Year	90/10 Year	Cost Estimate	Cost Estimate Source	From Bus Number	From Bus Name	To Bus Number	To Bus Name	Circuit	Voltages (kV)	Cost Allocation Voltage (kV)	Miles of New	Miles of Reconductor /Rebuild	Miles of Voltage Conversion	Rating
NTC-C	KS	Anthony - Bluff City 138 kV Ckt 1	Construct new 7-mile 138 kV line from Anthony to Bluff City.	Yes	36	2012	2015	2015	$8,335,592	MKEC	539001	ANTHONY	539004	BLUFF_CITY	1	138	138	7			190/190
NTC-C	KS	Bluff City - Caldwell 138 kV Ckt 1	Construct new 22-mile 138 kV line from Bluff City to Caldwell.	Yes	36	2012	2015	2015	$19,286,271	MKEC	539004	BLUFF_CITY	539005	CALDWELL	1	138	138	22			190/190
NTC-C	KS	Caldwell - Mayfield 138 kV Ckt 1	Construct new 16-mile 138 kV line from Caldwell to Mayfield.	Yes	36	2012	2015	2015	$14,413,382	MKEC	539005	CALDWELL	539006	MAYFIELD	1	138	138	16			190/190
NTC-C	KS	Mayfield - Milan 138 kV Ckt 1	Construct new 8-mile 138 kV line from Mayfield to Milan.	Yes	36	2012	2015	2015	$15,155,080	MKEC	539006	MAYFIELD	539676	MILAN 4	1	138	138	8			190/190
NTC-C	KS	Coldwater Tap - Shooting Star Wind 115 kV Ckt 1	Construct new 26-mile 115 kV line from Coldwater Tap to Shooting Star Wind.	Yes	36	2012	2015	2015	$13,724,798	MKEC	539010	COLD_TAP	539761	SSTARW 3	1	115	115	26			160/160
NTC-C	KS	Coldwater - Coldwater Tap 115 kV Ckt 1	Construct new 5.5-mile 115 kV line from Coldwater to Coldwater Tap.	Yes	36	2012	2015	2015	$7,028,362	MKEC	539000	COLDWATER	539010	COLD_TAP	1	115	115	5.5			160/160
NTC-C	KS	Clark Co. 345/115 kV Ckt 1 Transformer	Install new 345/115 kV transformer at Clark Co. substation. Install any necessary 115 kV terminal equipment.	Yes	24	2013	2015	2015	$10,516,124	SPP	539800	CLARKCOUNTY7	539052	CLARK_TP	1	345/115	115				
NTC-C	KS	Clark Co. 345 kV Ckt 1 Terminal Upgrades	Install any necessary 345 kV terminal equipment at Clark Co. associated with new 345/115 kV transformer.	Yes	24	2013	2015	2015	N/A		539800	CLARKCOUNTY7			1	345	345				
NTC-C	NM	Kiowa 345 kV Substation	Construct new Kiowa 345 kV substation adjacent to Potash Junction. 345 kV bus will be ring, expandable to minimum 6 line or transformer terminals. Install terminal equipment as needed.	Yes	48	2014	2018	2018	$10,142,928	SPS	527965	POTASH_JCT 7			1	345	345				
NTC-C	NM	Road Runner 345/115 kV Ckt 1 Transformer	Install new 345/115 kV 448 MVA transformer at new Road Runner substation. Install any necessary 115 kV terminal equipment.	Yes	48	2014	2018	2018	$4,577,343	SPS	528027	RDRUNNER 7	528025	RDRUNNER 3	1	345/115	115				448/448
NTC-C	NM	Road Runner 345 kV Substation Conversion	Convert 230 kV Road Runner substation to 345 kV. Install any necessary 345 kV terminal equipment.	Yes	48	2014	2018	2018	$3,930,065	SPS	528027	RDRUNNER 7			1	345	345				
NTC-C	NM	Kiowa 345/230 kV Ckt 1 Transformer	Install 560 MVA 345/230 kV transformer at Kiowa substation.	Yes	48	2014	2018	2018	$5,955,675	SPS	527965	POTASH_JCT 7			1	345/230	230				560/644
NTC-C	NM	Potash Junction - Road Runner 345 kV Ckt 1 Voltage	Convert 40-mile 230 kV line from Potash Junction to Road Runner to 345 kV.	Yes	48	2014	2018	2018	$7,097,576	SPS	527965	POTASH_JCT 7	528027	RDRUNNER 7	1	345	345		2	40	

Requested BOD Action	State(s)	Upgrade Name	Project Description/Comments	Issue NTC	Project Lead Time (Months)	50/50 Project Start Year	50/50 Year	90/10 Year	Cost Estimate	Cost Estimate Source	From Bus Number	From Bus Name	To Bus Number	To Bus Name	Circuit	Voltages (kV)	Cost Allocation Voltage (kV)	Miles of New	Miles of Reconductor /Rebuild	Miles of Voltage Conversion	Rating
		Conversion																			
NTC-C	NM	China Draw - North Loving 345 kV Ckt 1	Construct new 18.2-mile 345 kV line from North Loving to China Draw.	Yes	48	2014	2018	2018	$18,290,178	SPS	528185	NLOV_PLT 7	528223	CHINA_DRAW 7	1	345	345	18.2			
NTC-C	NM	Kiowa - North Loving 345 kV Ckt 1	Construct new 20.4-mile 345 kV line from North Loving to Kiowa.	Yes	48	2014	2018	2018	$23,457,538	SPS	528185	NLOV_PLT 7	527965	POTASH_JCT 7	1	345	345	20.4			
NTC-C	NM	China Draw 345/115 kV Ckt 1 Transformer	Install new 345/115 kV 448 MVA transformer at new China Draw substation. Install any necessary 115 kV terminal equipment and ring/breaker and a half 115 kV bus for 4 line or transformer terminals.	Yes	48	2014	2018	2018	$4,390,007	SPS	528223	CHINA_DRAW 7	528222	CHINA_DRAW 3	1	345/115	115				448/448
NTC-C	NM	China Draw 345 kV Ckt 1 Terminal Upgrades #1	Construct 345 kV ringbus, expandable to breaker and a half for 6 line or transformer terminals at China Draw.	Yes	48	2014	2018	2018	$4,318,803	SPS	528223	CHINA_DRAW 7			1	345	345				
NTC-C	NM	North Loving 345/115 kV Ckt 1 Transformer	Install new 345/115 kV 448 MVA transformer at new North Loving substation. Install any necessary 115 kV terminal equipment.	Yes	48	2014	2018	2018	$5,583,339	SPS	528185	NLOV_PLT 7	528186	NLOV_PLT TR1	1	345/115	115				560/644
NTC-C	NM	North Loving 345 kV Substation	Construct new 345 kV North Loving substation. Install any necessary 345 kV terminal equipment.	Yes	48	2014	2018	2018	$6,579,825	SPS	528185	NLOV_PLT 7				345	345				
NTC-C	NM	Livingston Ridge 115 kV Substation Conversion	Convert Livingston Ridge from 69 kV to 115 kV. Install any necessary 115 kV terminal equipment.	Yes	36	2015	2018	2018	$3,849,635	SPS	527953	LIVSTNRIDGE3			1	115	115				
NTC-C	NM	Sage Brush 115 kV Substation	Construct new 115 kV Sage Brush substation with 3 ring bus configuration. Install any necessary 115 kV terminal equipment.	Yes	36	2015	2018	2018	$4,007,502	SPS	527955	SAGEBRUSH 3			1	115	115				
NTC-C	NM	Livingston Ridge - Sage Brush 115 kV Ckt 1	Construct new 13.9-mile 115 kV line from Livingston Ridge to new Sage Brush substation.	Yes	36	2015	2018	2018	$7,286,428	SPS	527953	LIVSTNRIDGE3	527955	SAGEBRUSH 3	1	115	115	13.9			276/304
NTC-C	NM	Lagarto 115 kV Substation	Construct new 115 kV Lagarto substation. Install any necessary 115 kV terminal equipment.	Yes	36	2015	2018	2018	$1,382,368	SPS	527957	LAGARTO 3			1	115	115				
NTC-C	NM	Largarto - Sage Brush 115 kV Ckt 1	Construct new 10.4-mile 115 kV line from new Lagarto substation to new Sage Brush substation.	Yes	36	2015	2018	2018	$5,827,378	SPS	527957	LAGARTO 3	527955	SAGEBRUSH 3	1	115	115	10.4			276/304
NTC-C	NM	Cardinal 115 kV Substation	Construct new 115 kV Cardinal substation. Install any necessary 115 kV terminal	Yes	36	2015	2018	2018	$6,351,568	SPS	528596	CARDINAL 3			1	115	115	0.2			

Requested BOD Action	State(s)	Upgrade Name	Project Description/Comments	Issue NTC	Project Lead Time (Months)	50/50 Project Start Year	50/50 Year	90/10 Year	Cost Estimate	Cost Estimate Source	From Bus Number	From Bus Name	To Bus Number	To Bus Name	Circuit	Voltages (kV)	Cost Allocation Voltage (kV)	Miles of New	Miles of Reconductor /Rebuild	Miles of Voltage Conversion	Rating
			equipment.																		
NTC-C	NM	Cardinal - Lagarto 115 kV Ckt 1	Construct new 17.5-mile 115 kV line from Lagarto to Cardinal.	Yes	36	2015	2018	2018	$8,611,667	SPS	528596	CARDINAL 3	527957	LAGARTO 3	1	115	115	17.5			276/304
TBD	OK	Stonewall - Wapanucka 138 kV Ckt 1	Construct new 6.4-mile 138 kV line from Stonewall to Wapanucka.	No	36	2012	2015	2015	$8,934,149	AEP	521075	STONEWALL4	510949	WAPANUCKA4	1	138	138	6.4			322/484
TBD	OK	Ellis 138 kV Substation	Tap existing 138 kV line from Elk City to Red Hills Wind to construct new Ellis substation.	No	24	2013	2015	2015	$4,100,000	SPP	511561	ELLIS4				138	138				
Direct Assigned	KS	Sun City - Sun South 115 kV Ckt 1	Construct new 12.5-mile 115 kV line from Sun City to Sun South.	No	36	2012	2015	2015	$13,684,312	MKEC	539697	SUNCITY3	539007	SUN_SOUTH	1	115	115	12.5			160/160
Direct Assigned	KS	Midwest Pump - Midwest Pump Tap 115 kV Ckt 1	Build new 5-mile 115 kV line from Midwest Pump to the new Midwest Pump Tap substation.	No	36	2012	2015	2015	$3,689,116	SPP	530700	MWPMPTP	530701	MWPUMP	1	115	115	5			164/199
Direct Assigned	KS	Milton 138 kV Substation	Tap existing 115 kV line from Harper to Milan Tap to construct new Milton substation.	No	24	2013	2015	2015	$4,100,000	SPP	539019	MILTON				115	115				
Direct Assigned	KS	Tallgrass 138 kV Substation	Tap existing 138 kV line from Butler South to Weaver to construct new Tallgrass substation.	No	24	2013	2015	2015	$4,100,000	SPP	532993	TALGRAS4				138	138				
Direct Assigned	NM	Toboso Flats 115 kV Substation	Construct new 115 kV Toboso Flats substation. Install any necessary 115 kV terminal equipment.	No	36	2015	2018	2018	$810,097	SPS	528566	TOBOSO_FLTS3			1	115	115				
Direct Assigned	NM	Dollarhide - Toboso Flats 115 kV Ckt 1	Construct new 7.4-mile 115 kV line from new Toboso Flats substation to Dollarhide.	No	36	2015	2018	2018	$4,892,131	SPS	528561	DOLLARHIDE 3	528566	TOBOSO_FLTS3	1	115	115	7.4			276/304
Direct Assigned	NM	China Draw - Yeso Hills 115 kV Ckt 1	Construct new 18.4-mile 115 kV line from China Draw to new Yeso Hills substation.	No	36	2015	2018	2018	$13,659,867	SPS	528222	CHINA_DRAW 3	528246	YESO_HILLS 3	1	115	115	18.4			276/304
Direct Assigned	NM	Yeso Hills 115 kV Substation	Construct new 115 kV Yeso Hills substation. Install any necessary 115 kV terminal equipment.	No	36	2015	2018	2018	$1,047,575	SPS	528246	YESO_HILLS 3			1	115	115				
Direct Assigned	NM	Ponderosa 115 kV Substation	Construct new 115 kV Ponderosa substation. Install any necessary 115 kV terminal equipment.	No	36	2015	2018	2018	$997,575	SPS	528240	PONDEROSA 3			1	115	115				
Direct Assigned	NM	Ponderosa Tap 115 kV Substation	Tap the existing 115 kV line from Ochoa to Whitten to construct new 115 kV Ponderosa Tap substation. Install any necessary 115 kV terminal equipment.	No	36	2015	2018	2018	$4,071,449	SPS	528239	DISTSUB3TP 3			1	115	115	0.2			
Direct Assigned	NM	Ponderosa - Ponderosa Tap 115 kV Ckt 1	Construct new 9.3-mile 115 kV line from new Ponderosa substation to new Ponderosa Tap substation.	No	36	2015	2018	2018	$4,727,414	SPS	528239	DISTSUB3TP 3	528240	PONDEROSA 3	1	115	115	9.3			276/304

Requested BOD Action	State(s)	Upgrade Name	Project Description/Comments	Issue NTC	Project Lead Time (Months)	50/50 Project Start Year	50/50 Year	90/10 Year	Cost Estimate	Cost Estimate Source	From Bus Number	From Bus Name	To Bus Number	To Bus Name	Circuit	Voltages (kV)	Cost Allocation Voltage (kV)	Miles of New	Miles of Reconductor /Rebuild	Miles of Voltage Conversion	Rating
Direct Assigned	NM	Battle Axe - Road Runner 115 kV Ckt 1	Construct new 18.9-mile 115 kV line from Road Runner to Battle Axe.	No	36	2015	2018	2018	$12,574,305	SPS	528040	BATTLE_AXE 3	528025	RDRUNNER 3	1	115	115	18.9			276/304
Direct Assigned	NM	Battle Axe 115 kV Substation	Construct new 115 kV Battle Axe substation. Install any necessary 115 kV terminal equipment.	No	36	2015	2018	2018	$2,964,499	SPS	528040	BATTLE_AXE 3			1	115	115				
Direct Assigned	NM	Oxy South Hobbs 115 kV Substation	Tap existing 115 kV line from South Hobbs to the Switch 4J44 substation to construct new Oxy South Hobbs substation.	No	24	2016	2018	2018	$308,657	SPS	528480	OXY S_HOBBS3				115	115				
	NM	China Draw 115 kV SVC	Install new -50/+200 Mvar Static VAR Capacitor (SVC) at China Draw 115 kV bus.	No	30	2015	2018	2018	$40,000,000	SPP	528220	CHDRAW_SVC 1			1	115	115				-50/+200 Mvar
	NM	Toboso Flats 115 kV SVC	Install new -50/+200 Mvar Static VAR Capacitor (SVC) at Toboso Flats 115 kV bus.	No	30	2015	2018	2018	$40,000,000	SPP	528566	TOBOSO_FLTS3			1	115	115				-50/+200 Mvar
	OK	Mooreland - Woodward District EHV 345 kV Ckt 1	Construct WFEC's portion of new 10-mile 345 kV line from Mooreland to Woodward District EHV.	No	48	2014	2018	2018	$13,083,537	SPP	522400	MOORELND4	515375	WWRDEHV7	1	345	345	10			1004/1198

Table A.1: Transmission Needed for Load Connection

Appendix B: 2014 ITPNT Projects Needed for HPILS

Facility Owner	Upgrade Name	Project Description/Comments	2014 ITPNT Need Year	50/50 Need Year	90/10 Need Year	From Bus Number	From Bus Name	To Bus Number	To Bus Name	Circuit	Voltages (kV)	Miles of New	Miles of Reconductor/ Rebuild	Miles of Voltage Conversion	Rating
WR	East Manhattan - Jeffrey Energy Center 230 kV Ckt 1 Rebuild	Rebuild 27-mile 230 kV line from East Manhattan to Jeffrey Energy Center to 345 kV construction but operate as 230 kV using bundled 1590 ACSR conductor. Upgrade terminal equipment at East Manhattan and Jeffrey Energy Center to a minimum emergency rating of 2000 Amps.	2017	2018	2018	532861	EAST MANHATTAN 230 KV	532852	JEFFREY ENERGY CENTER 230 KV	1	230		27		797/797
SPS	Newhart 230/115 kV Transformer Ckt 2	Add second 230/115 kV 250 MVA transformer at Newhart substation.	2015	2015	2015	525461	Newhart Interchange 230 kV	525460	Newhart Interchange 115 kV	2	230/115				250/250
WFEC	Mustang - Sunshine Canyon 69 kV Ckt 1	Upgrade 9.9 miles of 69 kV line from Mustang to Sunshine Canyon from 4/0 to 556.	2014	2015	2015	521005	MUSTANG	521058	SUNSHINE CANYON	1	69		9.9		72/89
SPS	NE Hereford - Centre Street 115 KV Ckt 1	Build new 5.1-mile 115 kV line from Northeast Hereford to Centre Street. Convert Centre Street distribution transformer high side from 69 kV to 115 kV. Install necessary terminal equipment at Northeast Hereford.	2014	2018	2018	524567	Northeast Hereford Interchange 115 kV	524555	Hereford Centre Street Sub	1	115	7.8			245/275
AEP	Welsh Reserve - Wilkes 138KV Ckt 1 Rebuild	Rebuild 23.7 miles of 138 kV line from Wilkes to Welsh Reserve with 1926.9 ACSR/TW. Upgrade switches at both ends and wave traps, jumpers, CT ratios, and relay settings at Wilkes.	2019	2023	2023	508355	Welsh Reserve 138 kV	508840	WILKES 138KV	1	138		23.74		395/592
NPPD	Hoskins - Neligh 345 kV Ckt 1	Build a new 41-mile 345 kV line from Hoskins to Neligh.	2016	2018	2018	640226	Hoskins 345 kV	750013	Neligh 345 kV	1	345	41			1792/1792
NPPD	Neligh 345/115 kV Substation	Build new substation at Neligh. Install a new 345/115 kV transformer and all necessary 345 kV equipment at Neligh.	2016	2018	2018	750013	Neligh 345 kV	640293	Neligh 115 kV	1	345/115				458/474
NPPD	Neligh 115 kV Terminal Upgrades	Install necessary terminal equipment at the 115 kV bus in the new Neligh substation. Construct approximately 18 miles of new 115 kV transmission to tie Neligh East 345/115 kV into the existing 115 kV transmission system	2016	2018	2018	640293	Neligh 115 kV			1	115	11.4	7		
WR	Sumner County - Viola 138kV Ckt 1	Build new 28-mile 138 kV line from Viola to Sumner County.	2019	2023	2023	532984	SUMNER COUNTY 138 kV	533075	Viola 138kV	1	138	28			262/314
SPS	Quahada Switching Station 115 kV	Install 4-breaker ring bus to connect the Cunningham - PCA Interchange 115 kV line and the Lea National - Maljamar 115 kV line.	2015	2015	2015	528394	Quahada 115 kV				115	0.42			
WR	McDowell Creek Switching Station 115kV Terminal Upgrades	Upgrade terminal equipment including the wave trap at McDowell Creek Substation to a minimum of 1200 Amps.	2014	2015	2015	533335	MCDOWELL CREEK SWITCHING STATION 115 KV				115				201/239
WR	Neosho 138/69kV Transformer Ckt 1	Replace the existing Neosho #2 A, B, and C transformers with a single transformer with a minimum emergency rating of 165 MVA. Then, re-terminate the Neosho 138/69 kV #1 transformer from 533020-532793-532824 to 533021-532793-532824. This will move the 138 kV connection of this transformer from the Neosho South 138 kV bus (533020) to the Neosho 138 kV center bus (533021).	2014	2015	2015	533021	NEOSHO 138 KV	533768	NEOSHO 69 KV	1	345/138		0.5		150/165
AEP	Chapel Hill REC - Welsh Reserve 138 kV Rebuild Ckt 1	Rebuild 4.4 miles of 138 kV line from Chapel Hill REC to Welsh Reserve 138 kV.	2019	2023	2023	508337	CHAPEL HILL REC	508355	Welsh Reserve 138 kV		138		4.39		395/592
WFEC	Sandy Corner 138kV	Add 20 MVAr of capacitors at Sandy Corner 138 kV.	2017	2018	2015	520204	Sandy Corner 138 kV				138				20 MVAr
SEPC	Mingo 115 kV Capacitor Bank	Install 24-Mvar capacitor at Mingo substation.	2014	2015	2015	531429	MINGO			1	115				24 MVAr

Facility Owner	Upgrade Name	Project Description/Comments	2014 ITPNT Need Year	50/50 Need Year	90/10 Need Year	From Bus Number	From Bus Name	To Bus Number	To Bus Name	Circuit	Voltages (kV)	Miles of New	Miles of Reconductor/ Rebuild	Miles of Voltage Conversion	Rating
NPPD	Maxwell - North Platt 115 kV Terminal Upgrades	Upgrade substation equipment at Maxwell and North Platt substations to 1200 Amp to increase line rating to 215 MVA.	2014	2015	2015	640287	North Platte 115 kV	640267	Maxwell 115 kV		115				215/215
WR	Clay Center Switching Station 115kV Capacitor Bank	Install 10.8-Mvar capacitor bank at Clay Center Switching Station (bus# 533320).	2016	2018	2018	533320	Clay Center Switching Station 115 kV				115				10.8 MVAr
AEP	Broadmoor - Fort Humbug 69 kV Rebuild Ckt 1	Rebuild 1.7-mile 69 kV line from Fort Humbug to Broadmoor with 1233.6 ACSR/TW. Upgrade jumpers at Fort Humbug and jumpers and bus at Broadmoor.	2019	2023	2018	507716	BROADMOOR	507730	FORT HUMBUG 69KV	1	69		1.7		136/143
AEP	Dangerfield - Jenkins REC T 69 kV Rebuild Ckt 1	Rebuild 1.3-mile 69 kV line from Daingerfield to Jenkins REC T with 959.6 ACSR/TW.	2019	2023	2023	508288	DAINGERFIELD	508293	JENKINS REC T		69		1.3		132/178
AEP	Hallsville - Longview Heights 69 kV Rebuild Ckt 1	Rebuild 6.6-mile 69 kV line from Longview Heights to Hallsville with 1233.6 ACSR/TW. Upgrade jumpers, CT ratios, and relay settings at Longview Heights.	2014	2015	2015	508543	HALLSVILLE	508553	LONGVIEW HEIGHTS 69KV	1	69		6.6		68/89
AEP	Hallsville-Marshall 69 kV Rebuild Ckt 1	Rebuild 11.2-mile 69 kV line from Hallsville to Marshall with 1233.6 ACSR/TW. Upgrade jumpers, CT ratios, and relay settings at Marshall.	2014	2015	2015	508556	MARSHALL 69KV	508543	HALLSVILLE	1	69		11.2		68/89
SPS	CV Pines - Capitan 115 kV Conversion Ckt 1	Rebuild 5-mile 69 kV line from CV Pines to Capitan converting to 115 kV.	2017	2018	2018	527542	CV-PINES 3 115 kV	527541	Capitan 115 kV	1	115			5	245/265
SPS	Bailey County - Bailey Pump 115 kV Ckt 1	Build 10-mile 115 kV line from Bailey County to Bailey Pump. Install necessary terminal equipment at Bailey County.	2016	2016	2016	525028	Bailey County Interchange 115 kV	525040	Bailey Pump 115 KV	1	115	10			276/304
SPS	Bailey Pump - Sundan Rural 115 kV Ckt 1	Build 10-mile 115 kV line from Bailey County Pump to Sundan Rural and covert Bailey Pumb and Sundan Rural distribution transformer high side from 69 to 115 kV.	2016	2016	2016	525040	Bailey Pump 115 KV	525594	Sundan Rural 115 kV	1	115	10			276/304
WR	Crestview - Northeast 69 kV Ckt 1	Rebuild 5.64-mile 69 kV line from Crestview to Northeast.	2014	2015	2015	533822	NORTHEAST 69 KV	533789	CRESTVIEW 69 KV		69		5.59		131/143
SPS	Lamb County Sandhill 116/69 kV transformer	Install new 115/69 kV transformer 84 MVA. Install necessary 69 kV terminal equipment.	2016	2016	2016	525600	Lamb County Sandhill 115 kV	525599	Lamb County REC-Sandhill 115 kV	1	115/69				84/84
SPS	Sudan Rural - Lamb Co REC Sandhill 115 kV Ckt 1	Build 4.1-mile 115 kV line from Sudan Rural to Lamb County REC Sandhill. Install 115 kV terminal equipment for new 115/69 kV transformer.	2016	2016	2016	525594	Sundan Rural 115 kV	525600	Lamb County Sandhill 115 kV	1	115	4.1			276/304
WR	Kenmar - Northeast 69 kV Rebuild Ckt 1	Rebuild 69 kV line from Kenmar to Northeast with single 1192 ACSR to achieve 1200 Amp minimum ampacity.	2014	2015	2015	533822	NORTHEAST 69 KV	533811	KEN MAR 69 KV		69		1.74		131/143
SPS	Lamb Co REC Sandhill - Amherst 115 kV Ckt 1	Build 2.6-mile 115 kV line from Lamb County REC Sandhill to Amherst. Convert Amherst distribution transformer high side from 69 kV to 115 kV.	2016	2016	2016	525600	Lamb County Sandhill 115 kV	525608	Amherst 115 kV		115	2.6			276/304
SPS	Amherst - West Littlefield 115 kV Ckt 1	Build 4.9-mile 115 kV line from Amherst to West Littlefield. Convert West Littefield distribution transformer high side from 69 kV to 115 kV.	2016	2016	2016	525608	Amherst 115 kV	525615	West Littlefield 115 kV	1	115	4.9			276/304
SPS	West Littlefield - Lamb County 115 kV Conversion Ckt 1	Build 7-mile 115 kV line from West Littlefield to Lamb County converting. Install necessary terminal equipment at Lamb County.	2016	2016	2016	525615	West Littlefield 115 kV	525636	Lamb County Interchange 115 kV	1	115	7			276/304
OGE	County Line 69 kV Capacitor	Install a 9-Mvar capacitor bank at either County Line or Wildhorse substation.	2017	2015	2015	515126	County Line 69				69				9 MVAr
SEPC	Ruleton 115 Cap	Add an additional 12 MVAr of capacitance at Ruleton	2016	2015	2015	531357	RULETON			1	115				24 MVAr

Facility Owner	Upgrade Name	Project Description/Comments	2014 ITPNT Need Year	50/50 Need Year	90/10 Need Year	From Bus Number	From Bus Name	To Bus Number	To Bus Name	Circuit	Voltages (kV)	Miles of New	Miles of Reconductor/ Rebuild	Miles of Voltage Conversion	Rating
	Bank	substation.													
NPPD	Broken Bow Wind - Ord 115 kV Ckt 1	Build a new 35-mile 115 kV line from Ord to Broken Bow Wind and install necessary terminal equipment.	2014	2015	2015	640445	Broken Bow Wind	640308	Ord	1	115	42			160/176
OGE	Knobhill 138/12.5 kV Transformer	Install the new LANE 138-12.5 kV substation across the street from Knobhill sub. Install a new 138 kV terminal in Knobhill substation. Tie the new LANE substation and the existing Knobhill substations together with one span of 138 kV line. WFEC to eliminate the double circuit portion of the 138 kV Mooreland – Noel and the 138 kV Noel – Knobhill and return the 138 kV Mooreland – Knobhill to its original configuration. WFEC or OG&E to construct the new 1 ½ mile 138 kV Noel – LANE substation line.	2014	2016	2016	514795	KNOBHILL 138	514794	KNOBHILL 69		138/69	1.6			
OGE	Ahloso - Park Lane 138 kV conversion Ckt 1	Convert existing 4.32-mile 69 kV line from Ahloso to Park Lane to 138 kV.	2015	2021	2021	515178	PARK LANE 138	515318	Ahloso 138KV	1	138			4.39	268/286
OGE	Ahloso - Harden City 138 kV conversion Ckt 1	Convert existing 10.12-mile 69 kV line from Ahloso to Harden City to 138 kV.	2015	2021	2021	515318	Ahloso 138KV	515362	Harden City 138KV	1	138			10.12	268/286
OGE	Harden City - Frisco 138 kV conversion Ckt 1	Convert existing 3.39-mile 69 kV line from Harden City to Frisco to 138 kV.	2015	2021	2021	515500	Frisco 138 kV	515362	Harden City 138KV	1	138			3.39	268/286
OGE	Frisco - Lula 138 kV conversion Ckt 1	Convert existing 3.39-mile 69 kV line from Frisco to Lula to 138 kV.	2015	2021	2021	515192	LULA 138	515500	Frisco 138 kV	1	138			8.3	268/286
OPPD	S907 - S919 69 kV Ckt 1 Rebuild	Rebuild 3.4-mile 69kV line from S907 to S919.	2019	2023	2023	647907	S907 8	647919	S919 8	1	69		3.39		143/143

Table B.1: 2014 ITPNT Projects Needed for HPILS

Appendix C: HPILS Project List

Requested BOD Action*	State	Upgrade Name	Project Description/Comments	Issue NTC	Project Lead Time (Months)	50/50 Project Start Year	50/50 Year	90/10 Year	Cost Estimate	Cost Estimate Source	From Bus Number	From Bus Name	To Bus Number	To Bus Name	Ckt	Voltages (kV)	Cost Allocation Voltage (kV)	Miles of New	Miles of Recon /Rebuild	Miles of Voltage Conv	Rating
NTC	KS	Kansas Avenue - Dobson - Gano 115 kV Ckt 1 Terminal Upgrades	Replace switches at Dobson to achieve a rating of 229 MVA on the 115 kV line from Kansas Avenue to Dobson to Gano.	Yes	24	2013	2015	2015	$134,366	MKEC	531419	DOBSON 3	531480	KSAVWTP3	1	138	138		3.6		280/330
NTC	KS	Garden City - Kansas Avenue 115 kV Ckt 1 Terminal Upgrades	Replace CT settings, relays, and bus connections to achieve 154.6/189.2 MVA rating on the 115 kV line from Garden City to Kansas Avenue.	Yes	12	2014	2015	2015	$124,484	MKEC	531445	GRDNCTY3	531480	KSAVWTP3	1	115	115				154.6/189.2
NTC	KS	Harper - Rago 138 kV Ckt 1	Construct new 15-mile 138 kV line from Harper to new Rago substation.	Yes	36	2012	2015	2015	$13,666,262	MKEC	539668	HARPER 4	539017	RAGO	1	138	138	15			190/190
NTC	KS	Clark Tap - Minneola 115 kV Ckt 1	Construct new 7.5-mile 115 kV line from Clark Tap to Minneola.	Yes	36	2012	2015	2015	$6,602,085	MKEC	539052	CLARK_TP	539037	MINNEOLA	1	115	115	7.5			160/160
NTC	KS	Midwest Pump Tap 115 kV Substation	Tap existing 115 kV line from Kanarado (Sunflower) to Sharon Springs to construct new Midwest Pump Tap substation.	Yes	36	2012	2015	2015	$4,100,000	SPP	530700	MWPMPTP				115	115				
NTC	LA	Benteler - Port Robson 138 kV Ckt 1	Build 138 kV line from Benteler to Port Robson (circuit 1).	Yes	36	2012	2015	2015	$2,248,743	SPP	507792	BENTELER	507782	PROBSON4	1	138	138	3			344/500
NTC	LA	Benteler - Port Robson 138 kV Ckt 2	Build 138 kV line from Benteler to Port Robson (circuit 2).	Yes	36	2012	2015	2015	$2,548,575	SPP	507792	BENTELER	507782	PROBSON4	2	138	138	3.4			344/500
NTC	NE	Spalding 115 kV Cap Bank	Install second 15-Mvar capacitor bank at Spalding 115 kV substation.	Yes	12	2014	2015	2015	$600,000	NPPD	640347	SPALDNG7			1	115	115				15 Mvar
NTC	NE	S1260 161 kV Substation	Tap existing 161 kV line from S1259 to S1281 to construct new S1260 substation.	Yes	24	2013	2015	2015	$4,636,045	OPPD	646260	S1260 5				161	161				
NTC	NE	S1398 161 kV Substation	Tap existing 161 kV line from Humboldt to S1399 to construct new	Yes	24	2013	2015	2015	$2,824,664	OPPD	646398	S1398 5				161	161				

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Requested BOD Action*	State	Upgrade Name	Project Description/Comments	Issue NTC	Project Lead Time (Months)	50/50 Project Start Year	50/50 Year	90/10 Year	Cost Estimate	Cost Estimate Source	From Bus Number	From Bus Name	To Bus Number	To Bus Name	Ckt	Voltages (kV)	Cost Allocation Voltage (kV)	Miles of New	Miles of Recon /Rebuild	Miles of Voltage Conv	Rating
			S1398 substation.																		
NTC	NE	Thedford 345/115 kV Transformer	Install new 345/115 kV 400 MVA transformer at Thedford substation. Install any necessary 115 kV terminal equipment.	Yes	48	2012	2016	2016	$9,306,000	NPPD	640500	CHERRYC3	640381	THEDFRD7	1	345/115	115				400/400
NTC	NE	Thedford 345 kV Terminal Upgrades	Install any necessary 345 kV terminal equipment at Thedford associated with new 345/115 kV transformer.	Yes	48	2012	2016	2016	$930,800	NPPD	640500	CHERRYC3			1	345	345				400/400
NTC	NM	Eagle Creek 115 kV Cap Bank	Install 14.4 Mvar capacitor bank at Eagle Creek 115 kV bus.	Yes	12	2014	2015	2015	$1,360,435	SPS	527711	EAGLE_CREEK3			1	115	115				14.4 Mvar
NTC	NM	Potash Junction 230/115 kV Ckt 1	Upgrade 230/115 kV transformer at Potash Junction to 250 MVA.	Yes	24	2013	2015	2015	$3,320,942	SPS	527963	POTASH_JCT 6	527962	POTASH_JCT 3	1	230/115	115				250/288
NTC	NM	Andrews 230/115 kV Ckt 1 Transformer	Install new 230/115 kV 288 MVA transformer at Andrews substation. Install any necessary terminal equipment.	Yes	24	2013	2015	2015	$9,503,243	SPS	528604	ANDREWS 7	528601	ANDREWS_TR11	1	230/115	115	0.1			250/288
NTC	NM	Hopi Sub - North Loving 115 kV Ckt 1	Construct new 9.5-mile 115 kV line from Hopi Sub to North Loving 115 kV.	Yes	36	2012	2015	2015	$10,718,511	SPS	528226	HOPI_SUB 3	528182	NORTH_LOVNG3	1	115	115	9.5			276/304
NTC	NM	China Draw - North Loving 115 kV Ckt 1	Construct new 19.7-mile 115 kV line from North Loving to China Draw.	Yes	36	2012	2015	2015	$11,522,302	SPS	528182	NORTH_LOVNG3	528222	CHINA_DRAW 3	1	115	115	19.7			276/304
NTC	NM	Andrews - NEF 115 kV Ckt 1	Construct new 2.1-mile 115 kV line from Andrews to National Enrichment Facility (NEF).	Yes	36	2012	2015	2015	$4,108,415	SPS	528602	ANDREWS 3	528603	NA_ENRICH 3	1	115	115	2.1			525/525
NTC	NM	China Draw - Wood Draw 11k kV Ckt 1	Construct new 14-mile 115 kV line from China Draw to Wood Draw.	Yes	36	2015	2018	2018	$12,688,747	SPS	528222	CHINA_DRAW 3	528228	WOOD_DRAW 3	1	115	115	14			276/304
NTC	OK	Alva OGE 69 kV Terminal Upgrades	Upgrade CTs at Alva OGE substation to achieve a minimum 800 amp rating.	Yes	12	2014	2015	2015	$180,000	OGE	514792	ALVAOGE2			1	69	69				

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Requested BOD Action*	State	Upgrade Name	Project Description/Comments	Issue NTC	Project Lead Time (Months)	50/50 Project Start Year	50/50 Year	90/10 Year	Cost Estimate	Cost Estimate Source	From Bus Number	From Bus Name	To Bus Number	To Bus Name	Ckt	Voltages (kV)	Cost Allocation Voltage (kV)	Miles of New	Miles of Recon /Rebuild	Miles of Voltage Conv	Rating
NTC	OK	Jenson - Jenson Tap 138 kV Ckt 1 Terminal Upgrades	Upgrade CT and trap to 1200 amps at Jenson to increase rating of 138 kV line from Jenson Tap to Jenson to 268/286 MVA.	Yes	12	2014	2015	2015	$0	OGE	514820	JENSENT4	514821	JENSEN 4	1	138	138				268/286
NTC	OK	Freedom 69 kV Cap Bank	Install new 9.6-Mvar capacitor bank at Freedom 69 kV.	Yes	18	2013	2015	2015	$125,000	WFEC	520915	FREEDOM2			1	69	69				9.6 Mvar
NTC	OK	Carmen - Eagle Chief 69 kV Ckt 1 Reconductor	Reconductor 9-mile 69 kV line from Carmen to Eagle Chief to achieve a rating of 53/65 MVA.	Yes	24	2013	2015	2015	$3,492,160	SPP	520845	CARMEN 2	520890	EAGLCHF2	1	69	69		9		53/65
NTC	OK	Eagle Chief 69 kV Cap Bank	Install new 12-Mvar capacitor bank at Eagle Chief 69 kV.	Yes	18	2013	2015	2015	$190,000	WFEC	520890	EAGLCHF2			1	69	69				12 Mvar
NTC	OK	Darlington - Red Rock 138 kV Ckt 1	Construct new 8-mile 138 kV line from Red Rock to Darlington.	Yes	36	2012	2015	2015	$15,277,233	AEP	511548	REDROCKRD4	511559	DARLINGTNRD4	1	138	138	8			322/484
NTC	OK	Grady - Round Creek 138 kV Ckt 1	Construct new Round Creek box bay tap structure adjacent to the Rush Springs 138 kV substation. Construct new 6-mile 138 kV line from Grady to Round Creek. Install 3-breaker ring bus where hard tap to Round Creek intersects the Cornville to Duncan 138 kV transmission line.	Yes	36	2012	2015	2015	$12,132,497	AEP	511560	GRADY4	511427	RUSHNG 4	1	138	138	6			278/316
NTC	OK	Grady - Phillips 138 kV Ckt 1 & 2	Construct new 4-mile double circuit 138 kV line from the new 4-breaker ring bus station at Grady. Circuit 1 will terminate at Phillips Gas and Circuit 2 will terminate at Lindsey Water Flood.	Yes	36	2012	2015	2015	$8,318,584	AEP	511514	PHILPS 4	511560	GRADY4	1	138	138	4			278/316
NTC	TX	Mustang - Shell CO2 115 kV Ckt 1	Construct new 7.7-mile 115 kV line from Mustang to Shell CO2.	Yes	36	2012	2015	2015	$16,770,522	SPS	527146	MUSTANG 3	527062	SHELL_CO2 3	1	115	115	7.7			276/304
NTC-C	KS	Anthony - Bluff City 138 kV Ckt	Construct new 7-mile 138 kV line from Anthony to Bluff City.	Yes	36	2012	2015	2015	$8,335,592	MKEC	539001	ANTHONY	539004	BLUFF_CITY	1	138	138	7			190/190

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Requested BOD Action*	State	Upgrade Name	Project Description/Comments	Issue NTC	Project Lead Time (Months)	50/50 Project Start Year	50/50 Year	90/10 Year	Cost Estimate	Cost Estimate Source	From Bus Number	From Bus Name	To Bus Number	To Bus Name	Ckt	Voltages (kV)	Cost Allocation Voltage (kV)	Miles of New	Miles of Recon /Rebuild	Miles of Voltage Conv	Rating
		1																			
NTC-C	KS	Bluff City - Caldwell 138 kV Ckt 1	Construct new 22-mile 138 kV line from Bluff City to Caldwell.	Yes	36	2012	2015	2015	$19,286,271	MKEC	539004	BLUFF_CITY	539005	CALDWELL	1	138	138	22			190/190
NTC-C	KS	Caldwell - Mayfield 138 kV Ckt 1	Construct new 16-mile 138 kV line from Caldwell to Mayfield.	Yes	36	2012	2015	2015	$14,413,382	MKEC	539005	CALDWELL	539006	MAYFIELD	1	138	138	16			190/190
NTC-C	KS	Mayfield - Milan 138 kV Ckt 1	Construct new 8-mile 138 kV line from Mayfield to Milan.	Yes	36	2012	2015	2015	$15,155,080	MKEC	539006	MAYFIELD	539676	MILAN 4	1	138	138	8			190/190
NTC-C	KS	Coldwater Tap - Shooting Star Wind 115 kV Ckt 1	Construct new 26-mile 115 kV line from Coldwater Tap to Shooting Star Wind.	Yes	36	2012	2015	2015	$13,724,798	MKEC	539010	COLD_TAP	539761	SSTARW 3	1	115	115	26			160/160
NTC-C	KS	Coldwater - Coldwater Tap 115 kV Ckt 1	Construct new 5.5-mile 115 kV line from Coldwater to Coldwater Tap.	Yes	36	2012	2015	2015	$7,028,362	MKEC	539000	COLDWATER	539010	COLD_TAP	1	115	115	5.5			160/160
NTC-C	KS	Clark Co. 345/115 kV Ckt 1 Transformer	Install new 345/115 kV transformer at Clark Co. substation. Install any necessary 115 kV terminal equipment.	Yes	24	2013	2015	2015	$10,516,124	SPP	539800	CLARKCOUNTY7	539052	CLARK_TP	1	345/115	115				
NTC-C	KS	Clark Co. 345 kV Ckt 1 Terminal Upgrades	Install any necessary 345 kV terminal equipment at Clark Co. associated with new 345/115 kV transformer.	Yes	24	2013	2015	2015	N/A		539800	CLARKCOUNTY7			1	345	345				
NTC-C	KS	Ashland - Coldwater Tap 115 kV Ckt 1	Construct new 26-mile 115 kV line from Ashland to Coldwater Tap with a rating of 160 MVA.	Yes	36	2015	2018	2018	$21,596,406	MKEC	539030	ASHLAND1	539010	COLD_TAP	1	115	115	26			160/160
NTC-C	KS	Ashland - Clark Tap 115 kV Ckt 1	Construct new 24-mile 115 kV line from Ashland to Clark Tap with a rating of 160 MVA.	Yes	36	2015	2018	2018	$21,963,871	SPP	539030	ASHLAND1	539052	CLARK_TP	1	115	115	24			160/160
NTC-C	KS	Anthony - Harper 138 kV Ckt 1	Construct new 21-mile 138 kV line from Anthony to Harper.	Yes	36	2015	2018	2015	$20,992,491	MKEC	539001	ANTHONY	539668	HARPER 4	1	138	138	21			190/190

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Requested BOD Action*	State	Upgrade Name	Project Description/Comments	Issue NTC	Project Lead Time (Months)	50/50 Project Start Year	50/50 Year	90/10 Year	Cost Estimate	Cost Estimate Source	From Bus Number	From Bus Name	To Bus Number	To Bus Name	Ckt	Voltages (kV)	Cost Allocation Voltage (kV)	Miles of New	Miles of Recon /Rebuild	Miles of Voltage Conv	Rating
NTC-C	NM	Kiowa 345 kV Substation	Construct new Kiowa 345 kV substation adjacent to Potash Junction. 345 kV bus will be ring, expandable to minimum 6 line or transformer terminals. Install terminal equipment as needed.	Yes	48	2014	2018	2018	$10,142,928	SPS	527965	POTASH_JCT 7			1	345	345				
NTC-C	NM	Road Runner 345/115 kV Ckt 1 Transformer	Install new 345/115 kV 448 MVA transformer at new Road Runner substation. Install any necessary 115 kV terminal equipment.	Yes	48	2014	2018	2018	$4,577,343	SPS	528027	RDRUNNER 7	528025	RDRUNNER 3	1	345/115	115				448/448
NTC-C	NM	Road Runner 345 kV Substation Conversion	Convert 230 kV Road Runner substation to 345 kV. Install any necessary 345 kV terminal equipment.	Yes	48	2014	2018	2018	$3,930,065	SPS	528027	RDRUNNER 7			1	345	345				
NTC-C	NM	Kiowa 345/230 kV Ckt 1 Transformer	Install 560 MVA 345/230 kV transformer at Kiowa substation.	Yes	48	2014	2018	2018	$5,955,675	SPS	527965	POTASH_JCT 7			1	345/230	230				560/644
NTC-C	NM	Potash Junction - Road Runner 345 kV Ckt 1 Voltage Conversion	Convert 40-mile 230 kV line from Potash Junction to Road Runner to 345 kV.	Yes	48	2014	2018	2018	$7,097,576	SPS	527965	POTASH_JCT 7	528027	RDRUNNER 7	1	345	345		2	40	
NTC-C	NM	Hobbs - Kiowa 345 kV Ckt 1	Construct new 47.2-mile 345 kV line from Kiowa to Hobbs.	Yes	48	2014	2018	2018	$55,846,663	SPS	527965	POTASH_JCT 7	527896	HOBBS_INT 7	1	345	345	47.2			
NTC-C	NM	China Draw - North Loving 345 kV Ckt 1	Construct new 18.2-mile 345 kV line from North Loving to China Draw.	Yes	48	2014	2018	2018	$18,290,178	SPS	528185	NLOV_PLT 7	528223	CHINA_DRAW 7	1	345	345	18.2			
NTC-C	NM	Kiowa - North Loving 345 kV Ckt 1	Construct new 20.4-mile 345 kV line from North Loving to Kiowa.	Yes	48	2014	2018	2018	$23,457,538	SPS	528185	NLOV_PLT 7	527965	POTASH_JCT 7	1	345	345	20.4			
NTC-C	NM	China Draw 345/115 kV Ckt 1 Transformer	Install new 345/115 kV 448 MVA transformer at new China Draw substation. Install any necessary 115 kV terminal equipment and ring/breaker and a half 115 kV bus for 4 line or	Yes	48	2014	2018	2018	$4,390,007	SPS	528223	CHINA_DRAW 7	528222	CHINA_DRAW 3	1	345/115	115				448/448

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			transformer terminals.																		
NTC-C	NM	China Draw 345 kV Ckt 1 Terminal Upgrades #1	Construct 345 kV ringbus, expandable to breaker and a half for 6 line or transformer terminals at China Draw.	Yes	48	2014	2018	2018	$4,318,803	SPS	528223	CHINA_DRAW 7			1	345	345				
NTC-C	NM	North Loving 345/115 kV Ckt 1 Transformer	Install new 345/115 kV 448 MVA transformer at new North Loving substation. Install any necessary 115 kV terminal equipment.	Yes	48	2014	2018	2018	$5,583,339	SPS	528185	NLOV_PLT 7	528186	NLOV_PLT TR1	1	345/115	115				560/644
NTC-C	NM	North Loving 345 kV Substation	Construct new 345 kV North Loving substation. Install any necessary 345 kV terminal equipment.	Yes	48	2014	2018	2018	$6,579,825	SPS	528185	NLOV_PLT 7				345	345				
NTC-C	NM	Livingston Ridge 115 kV Substation Conversion	Convert Livingston Ridge from 69 kV to 115 kV. Install any necessary 115 kV terminal equipment.	Yes	36	2015	2018	2018	$3,849,635	SPS	527953	LIVSTNRIDGE3			1	115	115				
NTC-C	NM	Sage Brush 115 kV Substation	Construct new 115 kV Sage Brush substation with 3 ring bus configuration. Install any necessary 115 kV terminal equipment.	Yes	36	2015	2018	2018	$4,007,502	SPS	527955	SAGEBRUSH 3			1	115	115				
NTC-C	NM	Livingston Ridge - Sage Brush 115 kV Ckt 1	Construct new 13.9-mile 115 kV line from Livingston Ridge to new Sage Brush substation.	Yes	36	2015	2018	2018	$7,286,428	SPS	527953	LIVSTNRIDGE3	527955	SAGEBRUSH 3	1	115	115	13.9			276/304
NTC-C	NM	Lagarto 115 kV Substation	Construct new 115 kV Lagarto substation. Install any necessary 115 kV terminal equipment.	Yes	36	2015	2018	2018	$1,382,368	SPS	527957	LAGARTO 3			1	115	115				
NTC-C	NM	Largarto - Sage Brush 115 kV Ckt 1	Construct new 10.4-mile 115 kV line from new Lagarto substation to new Sage Brush substation.	Yes	36	2015	2018	2018	$5,827,378	SPS	527957	LAGARTO 3	527955	SAGEBRUSH 3	1	115	115	10.4			276/304
NTC-C	NM	Cardinal 115 kV Substation	Construct new 115 kV Cardinal substation. Install any necessary 115 kV terminal	Yes	36	2015	2018	2018	$6,351,568	SPS	528596	CARDINAL 3			1	115	115	0.2			

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			equipment.																		
NTC-C	NM	Cardinal - Lagarto 115 kV Ckt 1	Construct new 17.5-mile 115 kV line from Lagarto to Cardinal.	Yes	36	2015	2018	2018	$8,611,667	SPS	528596	CARDINAL 3	527957	LAGARTO 3	1	115	115	17.5			276/304
NTC-C	OK	Darlington - Roman Nose 138 kV Ckt 1	Construct new 25-mile 138 kV line from Darlington to Roman Nose.	Yes	36	2012	2015	2015	$26,416,440	AEP	511559	DARLINGTNRD4	514823	ROMNOSE4	1	138	138	25			278/316
NTC-C	OK	Carmen 138 kV Ckt 1Terminal Upgrades	Install any necessary 138 kV terminal equipment at Carmen associated with new 138/69 kV transformer.	Yes	24	2014	2016	2016			525845	CARMEN_138			1	138	138				70/70
NTC-C	OK	Carmen 138/69 kV Ckt 1 Transformer	Install new 138/69 kV 70 MVA transformer at Carmen substation. Install any necessary 69 kV terminal equipment.	Yes	24	2014	2016	2016	$2,810,198	SPP	525845	CARMEN_138	520845	CARMEN 2	1	138/69	69				70/70
NTC-C	OK	Cherokie Junction Tap 138/69 kV Ckt 1 Transformer	Install new 138/69 kV 70 MVA transformer at new Cherokie Junction Tap substation. Install any necessary 69 kV terminal equipment.	Yes	24	2014	2016	2016	$2,810,198	SPP	521302	CHERJTAP	520850	CHEROKJ2	1	138/69	69				70/70
NTC-C	OK	Carmen - Cherokie Junction 69 kV Ckt 1 Rebuild	Tear down the existing 69 kV line from Cherokie Junction to Carmen. Construct new 11.5-mile 138 kV line Cherokie Junction Tap to Carmen.	Yes	24	2014	2016	2016	$10,505,465	SPP	521302	CHERJTAP	525845	CARMEN_138	1	138	138		11.5		183/228
NTC-C	OK	Cherokie Junction Tap 138 kV Substation	Tap the existing 138 kV line from Noel Switch to C-City to construct the new Cherokie Junction Tap substation. Install any necessary 138 kV terminal equipment.	Yes	24	2014	2016	2016	$4,100,000	SPP	521302	CHERJTAP			1	138	138				183/228
NTC-C	OK	SW Station - Warwick Tap 138 kV Ckt 1	Construct new 138 kV SW Station switching station. Construct new 13-mile 138 kV line from new SW Station switching station to Warwick Tap.	Yes	36	2015	2018	2018	$28,572,000	OGE	515012	SW STATION	515047	WARWICK4	1	138	138	13			268/286

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NTC-C	OK	Linwood - SW Station 138 kV Ckt 1	Construct new 18-mile 138 kV line from Linwood to new SW Station switching station.	Yes	36	2015	2018	2018	N/A	OGE	515401	LINWOOD4	515012	SW STATION	1	138	138	18			268/286
NTC-C	OK	Knipe - SW Station 138 kV Ckt 1	Construct new 5-mile 138 kV line from Knipe to new SW Station switching station.	Yes	36	2015	2018	2018	N/A	OGE	515514	KNIPE 4	515012	SW STATION	1	138	138	5			268/286
NTC-C Modify	NM	Potash Junction - Road Runner 230 kV Ckt 1	Construct new 40-mile 345 kV line operated at 230 kV from Potash Junction to Road Runner.	Yes	42	2011	2015	2015	$3,491,968	SPS	527965	POTASH_JCT 7	528027	RDRUNNER 7	1	230	230	40.4			492/541
NTC-C Modify	NM	Road Runner 230/115 kV Substation	Construct new 230 kV Road Runner substation, tapping the existing 115 kV line from Red Bluff to Agave Hills. Install new 230/115 kV 288 MVA transformer at new Road Runner substation. Install any necessary terminal equipment.	Yes	42	2011	2015	2015	$2,107,123	SPS	528027	RDRUNNER 7	528025	RDRUNNER 3	1	230/115	115				250/288
NTC-C Modify	NM	Hobbs 345/230 kV Transformer Ckt 1	Expand existing Hobbs substation to accommodate 345 kV terminals. Install 345/230 kV 556 kV transformer at Hobbs.	Yes	48	2014	2018	2018	$10,262,813	SPS	527896	HOBBS_INT 7	527894	HOBBS_INT 6	1	345/230	230				560/644
NTC-C Modify	TX	Yoakum 345/230 kV Ckt 1 Transformer	Install new 345/230 kV 644 MVA transformer at Yoakum substation. Install any necessary 230 kV terminal equipment.	Yes	60	2015	2020	2020	$4,929,607	SPS	526936	YOAKUM_345	526935	YOAKUM 6	1	345/230	230				560/644
NTC-C Modify	TX	Yoakum 345 kV Ckt 1 Terminal Upgrades	Install any necessary 345 kV terminal equipment at Yoakum associated with new 345/230 kV transformer.	Yes	60	2015	2020	2020	$1,714,283	SPS	526935	YOAKUM 6			1	345	345				
NTC-C Modify	TX/NM	Hobbs - Yoakum 345 kV Ckt 1	Construct new 52-mile 345 kV line from Hobbs to Yoakum. Expand 345 kV bus at Hobbs.	Yes	60	2015	2020	2020	$69,907,711	SPS	527896	HOBBS_INT 7	526936	YOAKUM_345	1	345	345	52			

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NTC-C Modify	TX	Tuco - Yoakum 345 kV Ckt 1	Construct new 107-mile 345 kV line from Tuco to Yoakum.	Yes	60	2015	2020	2020	$160,991,967	SPP	525832	TUCO_INT 7	526936	YOAKUM_345	1	345	345	107			
TBD	OK	Stonewall - Wapanucka 138 kV Ckt 1	Construct new 6.4-mile 138 kV line from Stonewall to Wapanucka.	No	36	2012	2015	2015	$8,934,149	AEP	521075	STONEWALL4	510949	WAPANUCKA4	1	138	138	6.4			322/484
TBD	OK	Ellis 138 kV Substation	Tap existing 138 kV line from Elk City to Red Hills Wind to construct new Ellis substation.	No	24	2013	2015	2015	$4,100,000	SPP	511561	ELLIS4				138	138				
Direct Assigned	KS	Sun City - Sun South 115 kV Ckt 1	Construct new 12.5-mile 115 kV line from Sun City to Sun South.	No	36	2012	2015	2015	$13,684,312	MKEC	539697	SUNCITY3	539007	SUN_SOUTH	1	115	115	12.5			160/160
Direct Assigned	KS	Midwest Pump - Midwest Pump Tap 115 kV Ckt 1	Build new 5-mile 115 kV line from Midwest Pump to the new Midwest Pump Tap substation.	No	36	2012	2015	2015	$3,689,116	SPP	530700	MWPMPTP	530701	MWPUMP	1	115	115	5			164/199
Direct Assigned	KS	Milton 138 kV Substation	Tap existing 115 kV line from Harper to Milan Tap to construct new Milton substation.	No	24	2013	2015	2015	$4,100,000	SPP	539019	MILTON				115	115				
Direct Assigned	KS	Tallgrass 138 kV Substation	Tap existing 138 kV line from Butler South to Weaver to construct new Tallgrass substation.	No	24	2013	2015	2015	$4,100,000	SPP	532993	TALGRAS4				138	138				
Direct Assigned	NM	Toboso Flats 115 kV Substation	Construct new 115 kV Toboso Flats substation. Install any necessary 115 kV terminal equipment.	No	36	2015	2018	2018	$810,097	SPS	528566	TOBOSO_FLTS3			1	115	115				
Direct Assigned	NM	Dollarhide - Toboso Flats 115 kV Ckt 1	Construct new 7.4-mile 115 kV line from new Toboso Flats substation to Dollarhide.	No	36	2015	2018	2018	$4,892,131	SPS	528561	DOLLARHIDE 3	528566	TOBOSO_FLTS3	1	115	115	7.4			276/304
Direct Assigned	NM	China Draw - Yeso Hills 115 kV Ckt 1	Construct new 18.4-mile 115 kV line from China Draw to new Yeso Hills substation.	No	36	2015	2018	2018	$13,659,867	SPS	528222	CHINA_DRAW 3	528246	YESO_HILLS 3	1	115	115	18.4			276/304
Direct Assigned	NM	Yeso Hills 115 kV Substation	Construct new 115 kV Yeso Hills substation. Install any necessary 115 kV terminal	No	36	2015	2018	2018	$1,047,575	SPS	528246	YESO_HILLS 3			1	115	115				

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			equipment.																		
Direct Assigned	NM	Ponderosa 115 kV Substation	Construct new 115 kV Ponderosa substation. Install any necessary 115 kV terminal equipment.	No	36	2015	2018	2018	$997,575	SPS	528240	PONDEROSA 3			1	115	115				
Direct Assigned	NM	Ponderosa Tap 115 kV Substation	Tap the existing 115 kV line from Ochoa to Whitten to construct new 115 kV Ponderosa Tap substation. Install any necessary 115 kV terminal equipment.	No	36	2015	2018	2018	$4,071,449	SPS	528239	DISTSUB3TP 3			1	115	115	0.2			
Direct Assigned	NM	Ponderosa - Ponderosa Tap 115 kV Ckt 1	Construct new 9.3-mile 115 kV line from new Ponderosa substation to new Ponderosa Tap substation.	No	36	2015	2018	2018	$4,727,414	SPS	528239	DISTSUB3TP 3	528240	PONDEROSA 3	1	115	115	9.3			276/304
Direct Assigned	NM	Battle Axe - Road Runner 115 kV Ckt 1	Construct new 18.9-mile 115 kV line from Road Runner to Battle Axe.	No	36	2015	2018	2018	$12,574,305	SPS	528040	BATTLE_AXE 3	528025	RDRUNNER 3	1	115	115	18.9			276/304
Direct Assigned	NM	Battle Axe 115 kV Substation	Construct new 115 kV Battle Axe substation. Install any necessary 115 kV terminal equipment.	No	36	2015	2018	2018	$2,964,499	SPS	528040	BATTLE_AXE 3			1	115	115				
Direct Assigned	NM	Oxy South Hobbs 115 kV Substation	Tap existing 115 kV line from South Hobbs to the Switch 4J44 substation to construct new Oxy South Hobbs substation.	No	24	2016	2018	2018	$308,657	SPS	528480	OXY S_HOBBS3				115	115				
	KS	Sun South 115 kV Cap Bank	Install new 12-Mvar capacitor bank at Sun South 115 kV.	No	24	2016	2018	2015	$500,000	SPP	539007	SUN_SOUTH			1	115	115				12 Mvar
	KS	Rock Creek 69 kV Cap Bank	Install 9.6 Mvar capacitor bank at Rock Creek 69 kV.	No	18	2016	2018	2018	$500,000	SPP	533458	ROCKCRK2			1	69	69				9.6 Mvar
	KS	Caney 69 kV Cap Bank	Install 9.6 Mvar capacitor bank at Caney 69 kV.	No	18	2016	2018	2018	$500,000	SPP	533678	CANEY 2			1	69	69				9.6 Mvar
	KS	Coleman - Ripley 69 kV Rebuild Ckt 1	Rebuild 3.5-mile 69 kV line from Coleman to Ripley to achieve a rating of 131/143 MVA.	No	24	2016	2018	2018	$2,454,264	SPP	533787	COLEMAN2	533832	RIPLEYM2	1	69	69		3.5		131/157

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	KS	Cowskin - Goddtap 69 kV Terminal Upgrades	Upgrade terminal equipment at Cowskin to achieve a rating of 80 MVA on the 4.6-mile 69 kV line from Cowskin to Goddtap.	No	12	2018	2019	2018			533788	COWSKIN2	533879	GODDTAP2	1	69	69				80/80
	KS	Atchison - Maur Hill - Kerford 69 kV Ckt 1 Rebuild	Reconductor 69 kV line from Atchison Junction 1 to Maur Hill to achieve a rating of 41 MVA. Rebuild 1.7-mile 69 kV line from Kerford to Maur Hill to achieve a rating of 131/157 MVA.	No		2020	2020	2020	$4,500,000	WR	533472	ATCH J12	533475	KERFORD2	1	69	69				
	KS	Atchison Rebuilds Phase 1	Remove 69 kV line from Midwest Grain Solvents Junction 1 (STR 45 2) to Midwest Grain Solvents Junction 2 (Arnold Junction 2) to Arnold to Atchison Junction1 to Atchison Castings. Remove 69 kV line from Atchison Junction 2 to Maur Hill. Install zero impedance line between Arnold and Arnold Junction 2. Construct new 69 kV line from Atchison Junction 1 to Midwest Grain Solvents Junction 1 (STR 45 2). Construct new 69 kV line from Arnold Junction 2 to Atchison Junction 1 with a rating of 131/143 MVA. Reconductor 69 kV line from Atchison Junction 2 to Midwest Grain with a rating of 131/157 MVA. Construct new 138 kV line from Arnold Junction 2 to Atchison Junction 1 with a rating of 131/143 MVA. Construct new 138 kV line from Atchison Junction 2 to Midwest Grain Solvents Junction 1 (STR 45 2) with a	No		2020	2020	2020	$7,740,000	WR	533472	ATCH J12	533478	STR 45 2	1	138	138				

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			rating of 108 MVA. Construct new 138 kV line from Atchison Castings to Midwest Grain Solvents Junction 1 (STR 45 2) with a rating of 42 MVA. Construct new 138 kV line from Arnold Junction 2 to Midwest Grain with a rating of 131/157 MVA.																		
	KS	HEC - Huntsville 115 kV Ckt 1 Rebuild	Rebuild 28.8-mile 115 kV from HEC to Huntsville and upgrade CTs to achieve new rating of 83/99 MVA.	No	24	2021	2023	2023	$6,042,249	SPP	533419	HEC 3	530618	HUNTSVL3	1	115	115		7.7		83/99
	KS	Minneola 115 kV Cap Bank	Install new 18-Mvar capacitor bank at Minneola 115 kV.	No	18	2021	2023	2018	$500,000	SPP	539037	MINNEOLA			1	115	115				18 Mvar
	KS	Barber - Medicine Lodge 138 kV Ckt 1	Construct new 0.3-mile 138 kV line from Barber to Medicine Lodge.	No	36	2020	2023	2018	$217,378	SPP	539674	BARBER 4	539998	MED-LDG_138	1	138	138	0.29			
	KS	Barber 138/115 kV Ckt 1 Transformer	Install new 138/115 kV 250 MVA transformer at Barber substation. Install any necessary 138 kV terminal equipment	No	36	2020	2023	2018	$2,810,198	SPP	539673	MED-LDG3	539998	MED-LDG_138	1	138/115	115				250/250
	KS	Manning 115 kV Cap Bank	Install new 3-Mvar capacitor bank at Manning 115 kV.	No	18	2021	2023	2023	$500,000	SPP	531362	MANNGT 3			1	115	115				3 Mvar
	KS	Clearwater - Milan Tap 138 kV Rebuild (WR)	Rebuild Westar's portion of the 11.7-mile 138 kV line from Clearwater to Milan Tap to achieve a rating of 478 MVA.	No	24			2018	$10,688,169	SPP	533036	CLEARWT4	539675	MILANTP4	1	138	138		11.7		478/478
	KS	Clearwater - Milan Tap 138 kV Ckt 1 Rebuild (MKEC)	Rebuild Sunflower's portion of the 11.7-mile 138 kV line from Clearwater to Milan Tap to achieve a rating of 478 MVA.	No	24			2018	$10,688,169	SPP	533036	CLEARWT4	539675	MILANTP4	1	138	138		11.7		478/478
	KS	Milan 138 kV Cap Bank	Install new 18-Mvar capacitor bank at Milan 138 kV.	No				2023			539676	MILAN 4			1	138	138	18			

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	LA	Benteler - McDade 345 kV Ckt 1	Construct new 10-mile 345 kV line from Benteler to McDade.	No	48	2019	2023	2018	$13,083,537	SPP	507794	BENTELER7	507793	MCDADE 7	1	345	345	10			
	LA	McDade 345/138 kV Ckt 1 Transformer	Install new 345/138 kV 675 MVA transformer at McDade substation. Install any necessary 138 kV terminal equipment.	No	48	2019	2023	2018	$10,516,124	SPP	507793	MCDADE 7	507741	MCDADE 4	1	345/138	138				675/742.5
	LA	Messick 500/345 kV Ckt 1 Transformer	Install new 500/345 kV 1500 MVA transformer at Messick.	No	48	2019	2023	2018	$19,718,950	SPP	999113	8MESSICK	999115	8MESSICK	1	500/345	345				1500/1500
	LA	McDade - Messick 345 kV Ckt 1	Construct new 35-mile 345 kV line from McDade to Messick.	No	48	2019	2023	2018	$45,792,379	SPP	507793	MCDADE 7	999115	8MESSICK	1	345	345	35			
	LA	Benteler 345/138 kV Ckt 1 Transformer	Install new 345/138 kV 314 MVA transformer at Benteler substation. Install any necessary 138 kV terminal equipment.	No	48	2019	2023	2018	$10,516,124	SPP	507794	BENTELER7	507792	BENTELER	1	345/138	138				314/366
	LA	Western Electric Tap - Stonewall 138 kV Ckt 1 Terminal Upgrades	Replace station equipment at Stonewall. New emergency rating 309 MVA.	No	12			2023			507768	WESTELT4	509052	STONWAL4	1	138	138				246/331
	NE	Ainsworth 115 kV Cap Bank	Expand existing 9 Mvar bank to 15 Mvar capacitor bank at Ainsworth substation 115 kV bus.	No	24	2016	2018	2018	$50,000	NPPD	640051	AINSWRT7			1	115	115				15 Mvar
	NE	Plattesmouth - S985 69 kV Ckt 1 Terminal Upgrades	Upgrade CT on 6-mile 69kV line from Plattesmouthe to S985.	No	24	2021	2023	2023	$10,000	SPP	640320	PLTSMTH8	647985	S985 8	1	69	69		6		65/65
	NE	S906 - S928 69 kV Ckt 1 Rebuild	Rebuild 3.6-mile 69kV line from S906 to S928.	No	24	2021	2023	2023	$2,503,349	SPP	647006	S906 N 8	647928	S928 8	1	69	69		3.57		65/65
	NE	JCT205 - S901 69 kV Ckt 1 Rebuild	Rebuild 1.1-mile 69kV line from JCT205 to S901.	No	24	2021	2023	2023	$785,365	SPP	647901	S901 8	647105	JCT205 8	1	69	69		1.12		65/65
	NE	JCT205 - S910 69 kV Ckt 1	Rebuild 2.9-mile 69kV line from JCT205 to S910.	No	24	2021	2023	2023	$2,012,497	SPP	647910	S910 8	647105	JCT205 8	1	69	69		2.87		65/65

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		Rebuild																			
	NE	Emmet Tap 115 kV Cap Bank	Expand existing 18-Mvar capacitor bank to 27-Mvar capacitor bank at Emmet Tap 115 kV.	No	18			2018	$500,000	SPP	640465	EMMETE.TAP 7			1	115	115				27 Mvar
	NE	Broken Bow 115 kV Cap Bank	Install second 18-Mvar capacitor bank at Broken Bow 115 kV.	No	18			2015	$500,000	SPP	640089	BROKENB7			1	115	115				18 Mvar
	NE	Humboldt 161/69 kV Ckt 1 Transformer	Install new 161/69 kV 134 MVA transformer at Humboldt substation. Install any necessary 69 kV terminal equipment.	No	24			2018	$6,892,209	SPP	640234	HUMBOLDT5	647975	S975 8	1	161/69	69				134/134
	NE	Stuart - SW Holt 115 kV Ckt 1	Construct new 40-mile 115 kV line from Stuart to the new SW Holt substation.	No	36			2023	$29,512,930	SPP	640367	STUART 7	640701	SW.HOLT CO.7		115	115	40			240/240
	NE	SW Holt 345 kV Substation	Install any required 345 kV terminal equipment required to construct new SW Holt 345/115 kV substation.	No	24			2023	$11,668,774	SPP	640701	SW.HOLT CO.7				345	345				400/400
	NE	SW Holt 345/115 kV Ckt 1 Transformer	Tap the Holt Co. and Cherry Co. 345 kV line to construct the new SW Holt substation. Install 345/115 kV transformer at new substation. Install any required 115 kV terminal equipment.	No	24			2023	$10,516,124	SPP	640701	SW.HOLT CO.7	640700	SW.HOLT CO.3	1	345/115	115				400/400
	NE	S1258 345/161 kV Ckt 1 Transformer	Install new 345/161 kV 558 MVA transformer at S1258 substation. Install any necessary 161 kV terminal equipment.	No	24			2023	$10,516,124	SPP	645458	S3458 3	646258	S1258 5	1	345/161	161				558/558
	NE	Fullerton - PS24 115 kV Ckt 1	Construct new 15-mile 115 kV line from Fullerton to the PS24 substation.	No	36			2023	$11,067,349	SPP	640176	FULERTN7	640434	CEN.C.N7		115	115	15			160/160
	NM	North Loving - South Loving 115 kV Ckt 1	Construct new 3.4-mile 115 kV line from North Loving to South Loving.	No	36	2012	2015	2015	$6,928,199	SPS	528182	NORTH_LOVNG3	528192	SOUTH_LOVNG3	1	115	115	3.4			276/304
	NM	Artesia 115/69 kV	Upgrade 1st 115/69 kV transformer at Artesia to	No	24	2016	2018	2018	$2,496,948	SPP	527699	ARTSIA_TR1 1	527701	ARTESIA 2	1	115/69	69				84/84

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		Ckt 1 Transformer	84 MVA.																		
	NM	Artesia 115/69 kV Ckt 2 Transformer	Upgrade 2nd 115/69 kV transformer at Artesia to 84 MVA.	No	24	2016	2018	2018	$2,496,948	SPP	527700	ARTSIA_TR2 1	527707	ARTESIA 3	2	115/69	69				84/84
	NM	China Draw 115 kV SVC	Install new -50/+200 Mvar Static VAR Capacitor (SVC) at China Draw 115 kV bus.	No	30	2015	2018	2018	$40,000,000	SPP	528220	CHDRAW_SVC 1			1	115	115				-50/+200 Mvar
	NM	Toboso Flats 115 kV SVC	Install new -50/+200 Mvar Static VAR Capacitor (SVC) at Toboso Flats 115 kV bus.	No	30	2015	2018	2018	$40,000,000	SPP	528566	TOBOSO_FLTS3			1	115	115				-50/+200 Mvar
	NM	Potash Junction 345/115 kV Ckt 1 Transformer	Remove 345/230 kV transformer at Potash Junction. Replace with new 345/115 kV 448 MVA transformer. Expand 115 kV bus at Potash Junction as needed.	No	24	2017	2019	2019	$10,516,124	SPP	527965	POTASH_JCT 7	527962	POTASH_JCT 3	1	345/115	115				448/448
	NM	Andrews - Cardinal 115 kV Ckt 1	Construct new 12-mile 115 kV line from Andrews to Cardinal.	No	36	2018	2021	2019	$8,853,879	SPP	528602	ANDREWS 3	528596	CARDINAL 3	1	115	115	12			525/525
	NM	Andrews 345/115 kV Ckt 1 Transformer	Install new 345/115 kV 448 MVA transformer at Andrews substation and remove two 230/115 kV transformers. Install any necessary 115 kV terminal equipment.	No	48	2018	2022	2022	$10,516,124	SPP	528604	ANDREWS 7	528602	ANDREWS 3	1	345/115	115				448/448
	NM	Andrews - Hobbs 345 kV Ckt 1 Voltage Conversion	Convert existing 30.5-mile 230 kV line from Andrews to Hobbs to 345 kV. Re-terminate line on 345 kV bus at Hobbs. Ratings will be based on current conductors - bundled 795 ACSR.	No	48	2018	2022	2022	$30,530,000	SPP	528604	ANDREWS 7	527896	HOBBS_INT 7	1	345	345			30.53	
	NM	Road Runner - Sage Brush 115 kV Ckt 1	Construct new 20-mile 115 kV line from new Sage Brush substation to Road Runner.	No	36	2020	2023	2023	$14,756,465	SPP	527955	SAGEBRUSH 3	528025	RDRUNNER 3	1	115	115	20			276/304

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	NM	Battle Axe - Wood Draw 115 kV Ckt 1	Construct new 15-mile 115 kV line from Battle Axe to Wood Draw.	No	36	2020	2023	2023	$11,067,349	SPP	528040	BATTLE_AXE 3	528228	WOOD_DRAW 3	1	115	115	15			276/304
	NM	Livingston Ridge - IMC #1 Tap 115 kV Ckt 1 Reconductor	Reconductor 9.5-mile 115 kV line from Livingston Ridge to IMC #1 Tap.	No	24	2021	2023	2023	$4,351,605	SPP	528035	IMC_#1_TP 3	527953	LIVSTNRIDGE3	1	115	115		9.47		
	NM	Intrepid West Tap- Potash Junction 115 kV Ckt 1 Reconductor	Reconductor 1.5-mile 115 kV line from Intrepid West Tap to Potash Junction with 477 ACSS conductor to achieve a rating of 276/304 MVA.	No	24	2021	2023	2023	$693,867	SPP	527999	INTREPDW_TP3	527962	POTASH_JCT 3	1	115	115		1.51		276/304
	NM	IMC #2 - Intrepid West Tap 115 kV Ckt 1 Reconductor	Reconductor 3.9-mile 115 kV line from Intrepid West Tap to IMC #2 with 477 ACSS conductor to achieve a rating of 276/304 MVA.	No	24	2021	2023	2023	$1,787,512	SPP	527999	INTREPDW_TP3	528035	IMC_#1_TP 3	1	115	115		3.89		276/304
	NM	Oasis - Roosevelt County Interchange Switch 115 kV Ckt 1 Terminal Upgrades	Upgrade Oasis to SW_4K33 230 kV line trap: Increase Oasis to SW_4K33 230 kV line rating to 478/478 MVA.	No	12	2022	2023	2023			524875	OASIS 6	524915	SW_4K33 6	1	230	230				478/478
	NM	Curry 115 kV Load Move	Move Curry Load 69 kV to 115 kV : Move loads from Curry 69 kV to 115 kV	No	24	2021	2023	2023			524821	CURRY 2	524822	CURRY 3	1	115	115				
	NM	Battle Axe 345 kV Ckt 1 Terminal Upgrades	Construct new 345 kV terminal at the Battle Axe substation. Install any necessary 345 kV terminal equipment for 4 transformer/line terminations in ring configuration expandable to future breaker and a half.	No	48			2019			528041	BATTLE_AXE 7			1	345	345				
	NM	China Draw 345 kV Ckt 1 Terminal Upgrades #2	Install 345 kV terminal at China Draw to terminate the new 345 kV line from Battle Axe. Install any necessary 345 kV	No	48			2019			528223	CHINA_DRAW 7			1	345	345				

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			terminal equipment.																		
	NM	Battle Axe - Road Runner 345 kV Ckt 1	Construct new 15-mile 345 kV line from Battle Axe to Road Runner. Install 345 kV bus at Road Runner for 4 transformer or line terminations, expandable for future terminations.	No	48			2019	$19,625,305	SPP	528041	BATTLE_AXE 7	528027	RDRUNNER 7	1	345	345	15			
	NM	Battle Axe 345/115 kV Ckt 1 Transformer	Install new 345/115 kV 448 MVA transformer at new Battle Axe substation. Install any necessary 115 kV terminal equipment as expandable breaker and half design.	No	48			2019	$10,516,124	SPP	528041	BATTLE_AXE 7	528040	BATTLE_AXE 3	1	345/115	115				448/448
	NM	Dollarhide - South Jal Sub 115 kV Ckt 1 Reconductor	Reconductor 3.7-mile 115 kV line from Dollarhide to South Jal Sub with 477 ACSS conductor to achieve a rating of 276/304 MVA.	No	24			2023	$1,700,205	SPP	528561	DOLLARHIDE 3	528547	S_JAL 3	1	115	115		3.7		276/304
	NM	Ochoa - Ponderosa Tap 115 kV Ckt 1 Reconductor	Reconductor 9.1-mile 115 kV line from Ochoa to Ponderosa Tap with 477 ACSS conductor to achieve a rating of 276/304 MVA.	No	24			2023	$4,161,825	SPP	528232	OCHOA 3	528239	DISTSUB3TP 3	1	115	115		9.057		276/304
	NM	Ponderosa Tap - Whitten 115 kV Ckt 1 Reconductor	Reconductor 5.9-mile 115 kV line from Ponderosa Tap to Whitten with 477 ACSS conductor to achieve a rating of 276/304 MVA.	No	24			2023	$2,717,111	SPP	528239	DISTSUB3TP 3	528540	WHITTEN 3	1	115	115		5.913		276/304
	NM	Potash Junction 345/115 kV Ckt 2 Transformer	Install 2nd 345/115 kV 448 MVA transformer at Potash Junction. Expand 115 kV bus as needed for termination.	No	24			2019	$10,516,124	SPP	527965	POTASH_JCT 7	527962	POTASH_JCT 3	2	345/115	115				448/448
	OK	Elk City 138/69 kV Ckt 1 Transformer	Install new 138/69 kV 68/89 MVA transformer at Elk City substation. Install any necessary 69 kV terminal equipment.	No	24	2015	2017	2017	$2,810,198	SPP	511458	ELKCTY-4	511459	ELKCTY-2	1	138/69	69				68/89

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	OK	Elk City 138 kV Ckt 1 Terminal Upgrades	Install any necessary 138 kV terminal equipment at Elk City associated with new 138/69 kV transformer.	No	24	2015	2017	2017			511458	ELKCTY-4			1	138	138				68/89
	OK	El Reno 138 kV Cap Bank	Install new 24-Mvar capacitor bank at El Reno 138 kV.	No	18	2016	2018	2018	$504,000	SPP	520893	EL RENO4			1	138	138				24 Mvar
	OK	Winchester 69 kV Cap Bank	Install new 12-Mvar capacitor bank at Winchester 69 kV.	No	18	2016	2018	2015	$237,000	SPP	520408	WINCHESTER2			1	69	69				12 Mvar
	OK	Bufbear 138 kV Sub Conversion	Convert Bufbear substation to 138 kV.	No	24	2016	2018	2015			521120	BUFBEAR2			1	138	138				144/179
	OK	Buffalo 138/69 kV Ckt 1 Transformer	Install new 138/69 kV 70 MVA transformer at Buffalo substation. Install any necessary 69 kV terminal equipment.	No	24	2016	2018	2015	$2,810,198	SPP	521300	BUFFALO_138	520835	BUFFALO2	1	138/69	69				70/70
	OK	Bufbear - Ft. Supply 138 kV Ckt 1 Rebuild	Rebuild the 14.5-mile 69 kV line from Bufbear to Ft. Supply with 138 kV conductor.	No	24	2016	2018	2015	$13,246,021	SPP	520920	FTSUPLY4	521120	BUFBEAR2	1	138	138		14.5		144/179
	OK	Bufbear - Buffalo 138 kV Ckt 1 Rebuild	Rebuild the 3.3-mile 69 kV line from Bufbear to Buffalo with 138 kV conductor.	No	24	2016	2018	2015	$2,968,936	SPP	521120	BUFBEAR2	521300	BUFFALO_138	1	138	138		3.25		144/179
	OK	Mooreland - Woodward District EHV 345 kV Ckt 1	Construct WFEC's portion of new 10-mile 345 kV line from Mooreland to Woodward District EHV.	No	48	2014	2018	2018	$13,083,537	SPP	522400	MOORELND4	515375	WWRDEHV7	1	345	345	10			1004/1198
	OK	Alva OGE - Alva WFEC 69 kV Ckt 1 Reconductor (WFEC)	Reconductor WFEC's portion of the 2.1-mile 69 kV line from Alva OGE to Alva WFEC to achieve a new line rating of 134/143 MVA.	No	24	2016	2018	2018	$407,419	SPP	514792	ALVAOGE2	520806	ALVA 2	1	69	69		1.05		134/143
	OK	Alva OGE - Alva WFEC 69 kV Ckt 1 Reconductor (OGE)	Reconductor OGE's portion of the 2.1-mile 69 kV line from Alva OGE to Alva WFEC to achieve a new line rating of 134/143 MVA.	No	24	2016	2018	2018	$407,419	SPP	514792	ALVAOGE2	520806	ALVA 2	1	69	69		1.05		134/143

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	OK	Thomas Tap - Weatherford 69 kV Ckt 1 Rebuild	Rebuild 0.9-mile 69 kV line from Thomas Tap to Weatherford with 959.6 ACSR/TW conductor to achieve a new line rating of 68/94 MVA.	No	24	2019	2021	2021	$631,096	SPP	511517	THOMAST2	511481	WEATHER2	1	69	69		0.9		68/98
	OK	Roosevelt - Snyder 69 kV Ckt 1 Rebuild	Rebuild 14-mile 69 kV line from Roosevelt to Snyder with 959.6 ACSR/TW conductor to achieve a new line rating of 68/68 MVA. Upgrade jumpers at Snyder.	No	24	2019	2021	2021	$9,817,057	SPP	511444	ROSVTAP2	511475	SNYDER-2	1	69	69		14		68/68
	OK	Byron - Medlodge 138 kV Ckt 1 Rebuild	Rebuild existing 6.9-mile 69 kV line 138 kV line from Byron to Medlodge with 138 kV conductor.	No	24	2019	2021	2021	$6,303,279	SPP	520203	BYRON_138	522396	MEDLODGE	1	138	138		6.9		183/228
	OK	Hazelton - Medlodge 138 kV Ckt 1 Rebuild	Rebuild existing 12.6-mile 69 kV line from Hazelton to Medlodge with 138 kV conductor.	No	24	2019	2021	2021	$11,510,336	SPP	520937	HAZELTN2	522396	MEDLODGE	1	138	138		12.6		183/228
	OK	Border - Chisholm 345 kV Ckt 1	Cut in to 345 kV line from Border to Woodward District EHV and construct new 0.5-mile line to terminating at Chisholm 345kV substation, creating a Border - Chisholm EHV 345 kV line. Install any necessary 345 kV terminal equipment at Chisholm.	No	36	2018	2021	2021	$654,177	SPP	515458	BORDER 7	511553	ELKCITY7	1	345	345	0.5			1475/1623
	OK	Chisholm - Woodward District EHV 345 kV Ckt 1	Cut in to 345 kV line from Border to Woodward District EHV and construct new 0.5-mile line to terminating at Chisholm 345kV substation, creating a Chisholm - Woodward District EHV 345 kV line. Install any necessary 345 kV terminal equipment at Chisholm.	No	36	2018	2021	2021	$654,177	SPP	511553	ELKCITY7	515375	WWRDEHV7	1	345	345	0.5			1475/1623

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	OK	Chisholm 345/230 kV Ckt 2 Transformer	Install 2nd 345/230 kV 675 MVA transformer at Chisholm substation. Install any necessary 230 kV terminal equipment.	No	36	2018	2021	2021	$10,516,124	SPP	511553	ELKCITY7	511490	ELKCITY6	2	345/230	230				675/742.5
	OK	Clyde - Grant County 138 kV Ckt 1 Rebuild	Remove existing 9-mile 69 kV line from Clyde to Grant County and replace with new 138 kV line.	No	24	2021	2023	2023	$8,175,993	SPP	514719	CLYDE 2	515546	GRANTCO4	1	138	138		8.95		268/308
	OK	Clyde - Four Corners 138 kV Ckt 1 Reconductor	Reconductor 10.1-mile 138 kV line from Clyde to Four Corners.	No	24	2021	2023	2018	$5,625,708	SPP	514719	CLYDE 2	514736	4CORNER2	1	138	138		10.05		268/308
	OK	Four Corners - Kremlin 138 kV Ckt 1 Reconductor	Reconductor 8.1-mile 138 kV line from Four Corners to Kremlin.	No	24	2021	2023	2018	$4,511,762	SPP	514736	4CORNER2	515501	KREMLNT2	1	138	138		8.06		268/308
	OK	Kremlin - NE Enid 138 kV Ckt 1 Rebuild	Remove existing 8-mile 69 kV line from Kremlin to NE Enid and replace with new 138 kV line.	No	24	2021	2023	2023	$7,262,474	SPP	515501	KREMLNT2	514769	NE ENID4	1	138	138		7.95		268/308
	OK	Sandridge 138 kV Cap Bank	Install new 9-Mvar capacitor bank at Sandridge 138 kV.	No	18	2021	2023	2015	$185,004	SPP	520409	SAND RDG_138			1	138	138				9 Mvar
	OK	Brady 69 kV Cap Bank	Install new 12-Mvar capacitor bank at Brady 69 kV.	No	18	2021	2023	2018	$237,000	SPP	520830	BRADY 2			1	69	69				12 Mvar
	OK	Glasses - Russet 138 kV Ckt Terminal Upgrades	Increase capacity of Russet CT from 600 amps to 800 amps to increase the emergency rating on 138 kV line from Glasses to Russet to 152.7 MVA.	No	12	2022	2023	2023			515147	GLASSES4	515120	RUSSET-4	1	138	138				133/152.7
	OK	Cleo 69 kV Cap Bank	Install 9-Mvar capacitor bank at Cleo 69 kV.	No	18	2021	2023	2023	$740,254	SPP	514791	CLEO 2			1	69	69				9 Mvar
	OK	Saline 69 kV Cap Bank	Install 9-Mvar capacitor bank at Saline 69 kV.	No	18	2021	2023	2023	$740,254	SPP	514716	SALINE 2			1	69	69				9 Mvar
	OK	Gypsum - Russell 69 kV Ckt 1 Rebuild	Rebuild the 4-mile 69 kV line from Gypsum to Russell to achieve a rating of 53/65 MVA.	No	24	2021	2023	2023	$2,804,873	SPP	520929	GYPSUM 2	521042	RUSSELL2	1	69	69		4		53/65

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	OK	El Dorado Junction - Gypsum 69 kV Ckt 1 Rebuild	Rebuild the 7.1-mile 69 kV line from El Dorado Junction to Gypsum to achieve a rating of 53/65 MVA.	No	24	2021	2023	2023	$4,978,650	SPP	520895	ELDORDJ2	520929	GYPSUM 2	1	69	69		7.1		53/65
	OK	El Dorado - Lake Pauline WTU 69 kV Ckt 1 Rebuild	Rebuild the 15-mile 69 kV line from El Dorado to Lake Pauline WTU to achieve a rating of 53/65 MVA.	No	24	2021	2023	2023	$10,518,275	SPP	520896	ELDORDO2	512111	LAKEP2WT	1	69	69		15		53/65
	OK	Sugden 69 kV Cap Bank	Install new 12-Mvar capacitor bank at Sugden 69 kV.	No	18	2021	2023	2023	$237,000	SPP	521057	SUGDEN 2			1	69	69				12 Mvar
	OK	Walville 69 kV Cap Bank	Install new 4.8-Mvar capacitor bank at Walville 69 kV.	No	18	2021	2023	2023	$237,000	SPP	521087	WALVILL2			1	69	69				4.8 Mvar
	OK	Kinzie - 19th Street 138 kV Ckt 1 Terminal Upgrades	Restore the rating of the 138 kV line from Kinzie to 19th Street to 203/238 MVA.	No	12	2022	2023	2018			512710	KINZEGR4	512712	19TH ST4	1	138	138				203/238
	OK	Little River - Maud Tap 69 kV Ckt 1 Reconductor	Reconductor 10.7-mile 69 kV line from Little River to Maud Tap to achieve a new line rating of 52.6/65.7 MVA.	No	24			2015	$4,163,431	SPP	515503	LTRIVRT2	515054	MAUD 2	1	69	69		10.73		52.6/65.7
	OK	Northeast Station - Watova 138 kV Ckt 1 Terminal Upgrade	Replace wave traps at Northeast Station and Nowata 138 kV to achieve a new line rating of 202/235 MVA.	No	12			2018			510396	N.E.S.-4	510384	WATOVA 4	1	138	138				202/235
	OK	Winchester Tap 69 kV Cap Bank	Install new 24-Mvar capacitor bank at Winchester Tap 69 kV.	No	24			2015	$237,000	SPP	520408	WINCHESTER2			1	69	69				24 Mvar
	OK	Bartlesville Commanche - Mound Road 138 kV Ckt 1 Rebuild	Rebuild 2.8-mile 138 kV line from Bartlesville Commanche to Mound Road with 1533.6 ACSR/TW conductor. Upgrade CT ratios and relay settings.	No	24			2015	$2,557,852	SPP	510390	BV-COM-4	510395	MOUNDRD4	1	138	138		2.8		212/212
	OK	Park Lane - Seminole 138 kV Ckt Terminal	Upgrade CT on 138 kV line from Park Lane to Seminole to increase the line rating to 382.4	No	12			2023			515044	SEMINOL4	515178	PARKLN 4	1	138	138				382.4/382.4

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Requested BOD Action*	State	Upgrade Name	Project Description/Comments	Issue NTC	Project Lead Time (Months)	50/50 Project Start Year	50/50 Year	90/10 Year	Cost Estimate	Cost Estimate Source	From Bus Number	From Bus Name	To Bus Number	To Bus Name	Ckt	Voltages (kV)	Cost Allocation Voltage (kV)	Miles of New	Miles of Recon /Rebuild	Miles of Voltage Conv	Rating
		Upgrades	MVA.																		
	OK	Seminole - Vanoss 138 kV Ckt Terminal Upgrades	Replace wave trap on 138 kV line from Seminole to Vanoss to increase the line rating to 310/354 MVA.	No	12			2023			515044	SEMINOL4	515174	VANOSS 4	1	138	138				310/354
	OK	Glencoe 138 kV Cap Bank	Add 14.4 Mvar capacitor bank to Glencoe 138 kV.	No	18			2023	$500,000	SPP	301425	4GLENCOE			1	138	138				14.4 Mvar
	OK	Keystone - Wekiwa 69 kV Ckt 1 Rebuild	Rebuild 2.0 miles to 1533.6 ACSR/TW. New ratings 191/191 MVA.	No	24			2023	$1,827,037	SPP	505610	KEYSTON4	509757	WEKIWA-4	1	138	138		2		191/191
	OK	Nowata - Watova 138 kV Ckt 1 Terminal Upgrade	Replace wave traps at Northeast Station and Nowata 138 kV to achieve a new line rating of 202/235 MVA.	No	12			2023			510397	NOWATA-4	510384	WATOVA 4	1	138	138				202/235
	TX	Hereford 115/69 kV Ckt 1 Transformer	Upgrade 1st 115/69 kV transformer at Hereford to 84 MVA.	No	24	2016	2018	2018	$2,496,948	SPP	524606	HEREFORD 3	524602	HERFRD_TR1 1	1	115/69	69				84/84
	TX	Hereford 115/69 kV Ckt 2 Transformer	Upgrade 2nd 115/69 kV transformer at Hereford to 84 MVA.	No	24	2016	2018	2018	$2,496,948	SPP	524606	HEREFORD 3	524603	HERFRD_TR2 1	2	115/69	69				84/84
	TX	Hale County - Tuco 115 kV Ckt 1 Reconductor	Reconductor 20.5-mile 115 kV line from Tuco to Hale County with 477 ACSS conductor.	No	24	2016	2018	2018	$9,415,457	SPP	525454	HALE_CNTY 3	525828	TUCO_INT 3	1	115	115		20.49		276/304
	TX	Kiser 115 kV Cap Banks	Install two (2) 14.4 Mvar capacitor banks at Kiser 115 kV bus.	No	18	2016	2018	2018	$697,688	SPP	525272	KISER 3			1	115	115				28.8 Mvar
	TX	Big Sandy - Perdue 69 kV Ckt 1 Rebuild	Rebuild 5.5-mile 69 kV line from Big Sandy to Perdue with 1233.6 ACSR/TW conductor to achieve a new line rating of 123/143 MVA.	No	24	2017	2019	2018	$3,856,701	SPP	508335	BIGSNDY2	508350	PERDUE 2	1	69	69		5.5		123/143
	TX	Bowers - Grapevine 115 kV Reconductor	Reconductor 3.9-mile 115 kV line from Bowers to Grapevine with 477 ACSS conductor.	No	24	2017	2019	2019	$1,796,703	SPP	523748	BOWERS 3	523770	GRAPEVINE 3	1	115	115		3.91		276/304

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Requested BOD Action*	State	Upgrade Name	Project Description/Comments	Issue NTC	Project Lead Time (Months)	50/50 Project Start Year	50/50 Year	90/10 Year	Cost Estimate	Cost Estimate Source	From Bus Number	From Bus Name	To Bus Number	To Bus Name	Ckt	Voltages (kV)	Cost Allocation Voltage (kV)	Miles of New	Miles of Recon /Rebuild	Miles of Voltage Conv	Rating
	TX	Allen Substation - Lubbock South Interchange 115 kV Ckt 1 Rebuild.	Rebuild 6 miles of 115 kV line from Lubbock South Interchange to Allen Substation.	No	24		2019	2019	$4,786,717	SPP	526268	Lubbock South Interchange 115 kV	526213	Allen Sub 115 kV	1	115	115		6.1		273/300
	TX	Hitchland 230/115 kV Ckt 2 Transformer	Add 2nd 230/115 kV 250 MVA transformer at Hitchland.	No	24	2021	2023	2023	$6,020,434	SPP	523095	HITCHLAND 6	523093	HITCHLAND 3	2	230/115	115				250/288
	TX	Carlisle 230/115kV Ckt 1 Transformer	Increase Carlisle 230/115 kV transformer to 250 MVA.	No	24	2021	2023	2023	$6,020,434	SPP	526161	CARLISLE 6	526160	CARLISLE 3	1	230/115	115				250/288
	TX	Lone Star South - Wilkes 138 kV Ckt 1 Terminal Upgrades	Upgrade CTs at Wilkes 138 kV to achieve a new rating of 423/423 MVA on the Lone Star South to Wilkes 138 kV line.	No	12	2022	2023	2015			508297	LSSOUTH4	508840	WILKES 4	1	138	138				423/423
	TX	Sundown - Wolfforth 230 kV Ckt 1 Reconductor	Reconductor 24.6-mile 230 kV line from Sundown to Wolfforth to achieve a rating of 598/598 MVA.	No	24	2021	2023	2023	$22,580,725	SPP	526435	SUNDOWN 6	526525	WOLFFORTH 6	1	230	230		24.62		598/598
	TX	Sundown 230/115 kV Ckt 2 Transformer	Install 2nd 230/115 kV 250 MVA transformer at Sundown.	No	24	2021	2023	2023	$6,020,434	SPP	526435	SUNDOWN 6	526434	SUNDOWN 3	1	230/115	115				250/288
	TX	Lubbock South - Wolfforth 230 kV Ckt 1 Terminal Upgrades	Replace line trap to increase the rating on the 230 kV line from Lubbock South to Wolfforth to 478/502 MVA.	No	12	2022	2023	2023			526269	LUBBCK_STH 6	526525	WOLFFORTH 6	1	230	230				478/502
	TX	Plant X 230/115 kV Ckt 2 Transformer	Add 2nd 230/115 kV 250 kV transformer at Plant X.	No	24	2021	2023	2023	$6,020,434	SPP	525481	PLANT_X 6	525480	PLANT_X 3	2	230/115	115				250/288
	TX	Seminole 230/115 kV Ckt 1 Transformer	Increase 1st 230/115 kV transformer at Seminole to 250 MVA.	No	24	2021	2023	2023	$6,020,434	SPP	527276	SEMINOLE 6	527275	SEMINOLE 3	1	230/115	115				250/288
	TX	Seminole 230/115 kV Ckt 2 Transformer	Increase 2nd 230/115 kV transformer at Seminole to 250 MVA.	No	24	2021	2023	2023	$6,020,434	SPP	527276	SEMINOLE 6	527275	SEMINOLE 3	2	230/115	115				250/288

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Requested BOD Action*	State	Upgrade Name	Project Description/Comments	Issue NTC	Project Lead Time (Months)	50/50 Project Start Year	50/50 Year	90/10 Year	Cost Estimate	Cost Estimate Source	From Bus Number	From Bus Name	To Bus Number	To Bus Name	Ckt	Voltages (kV)	Cost Allocation Voltage (kV)	Miles of New	Miles of Recon /Rebuild	Miles of Voltage Conv	Rating
	TX	Wolfforth 230/115 kV Ckt 1 Transformer	Increase 230/115 kV transformer Wolfforth to 250 MVA.	No	24	2021	2023	2023	$6,020,434	SPP	526525	WOLFFORTH 6	526524	WOLFFORTH 3	1	230/115	115				250/288
	TX	Deaf Smith - Hereford 115 kV Ckt 2 Reconductor	Reconductor second 2.2-mile 115 kV line from Deaf Smith to Hereford with 477 ACSS conductor to achieve a new rating of 276/304 MVA.	No	24	2021	2023	2023	$997,147	SPP	524606	HEREFORD 3	524622	DEAFSMITH 3	2	115	115		2.17		276/304
	TX	Puckett - Soncy Tap 115 kV Ckt 1 Reconductor	Reconductor 0.7-mile 115 kV line from Puckett to Soncy Tap with 477 ACSS conductor to achieve a new rating of 276/304 MVA.	No	24	2021	2023	2023	$326,255	SPP	524256	PUCKETT 3	524252	SONCY_TP 3	1	115	115		0.71		276/304
	TX	Coulter - Puckett 115 kV Ckt 1 Reconductor	Reconductor 2.3-mile 115 kV line from Coulter to Puckett with 477 ACSS conductor to achieve a rating of 276/304 MVA.	No	24	2021	2023	2023	$1,056,884	SPP	524306	COULTER 3	524256	PUCKETT 3	1	115	115		2.3		276/304
	TX	Northwest - Rolling Hills 115 kV Reconductor Ckt 1	Reconductor 8.3-mile 115 kV line from Northwest to Rolling Hills with 477 ACSS conductor to achieve a rating of 276/304 MVA.	No	24	2021	2023	2023	$3,832,353	SPP	524007	ROLLHILLS 3	524106	NORTHWEST 3	1	115	115		8.34		276/304
	TX	Frankford Sub - Murphy 115 kV Ckt 1 Terminal Upgrades	Increase Murphy to Frankford 115 kV line rating to 159/160 MVA.	No	12	2022	2023	2023			526192	MURPHY 3	526199	SP-FRANKFRD3	1	115	115				159/160
	TX	Castro 115 kV Cap Banks	Install two (2) 14.4-Mvar capacitor banks at Castro 115 kV.	No	18	2021	2023	2023	$697,688	SPP	524746	CASTRO_CNTY3			1	115	115				28.8 Mvar
	TX	Graham 115 kV Cap Banks	Install two (2) 7.5 Mvar capacitor banks at Graham 69 kV.	No	18	2021	2023	2023	$697,688	SPP	526693	GRAHAM 2			1	69	69				15 Mvar
	TX	Newtext 115 kV Cap Bank	Install 7.5 Mvar capacitor bank at Newtext 69 kV.	No	18	2021	2023	2023	$697,688	SPP	528718	LE-NEWTEX 2			1	69	69				7.5 Mvar
	TX	Bowers 115 kV Load Move	Move loads from Bowers 2 - 69 kV to Bowers 3 - 115 kV	No	24	2021	2023	2023			523747	BOWERS 2	523748	BOWERS 3	1	115	115				

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Requested BOD Action*	State	Upgrade Name	Project Description/Comments	Issue NTC	Project Lead Time (Months)	50/50 Project Start Year	50/50 Year	90/10 Year	Cost Estimate	Cost Estimate Source	From Bus Number	From Bus Name	To Bus Number	To Bus Name	Ckt	Voltages (kV)	Cost Allocation Voltage (kV)	Miles of New	Miles of Recon /Rebuild	Miles of Voltage Conv	Rating
	TX	Acuff - Idalou 69 kV Ckt 1	Tap 115 kV line from Crosby to Lubbock East - 69 kV bus via - New Line - 2.45 mile, 69kV - Connect SP-ACUFF to SP-IDALOU	No	24	2021	2023	2023			525906	SP-ACUFF 2	526116	SP-IDALOU 2	1	69	69	2.45			
	TX	Vickers 115 kV Load Move	Move Vicksburg Load 69 kV to 115 kV: Move load from Vickers 69 kV to 115 kV	No	24	2021	2023	2023			526123		526124	VICKERS 3	1	115	115				
	TX	Carlisle - Doud Tap 115 kV Ckt 1 Reconductor	Reconductor 2.3-mile 115 kV line from Carlisle to Doud Tap to achieve a new rating of 276/304.	No	24	2021	2023	2023	$1,148,787	SPP	526160	CARLISLE 3	526162	LP-DOUD_TP 3	1	115			2.5		276/304
	TX	Doud - Doud Tap 115 kV Ckt 1 Reconductor	Reconductor 1.7-mile 115 kV line from Doud to Doud Tap to achieve a new rating of 276/304.	No	24	2021	2023	2023	$781,175	SPP	526162	LP-DOUD_TP 3	526176	LP-DOUD 3	1	115			1.7		276/304
	TX	Doud Tap - Wolf Tap 115 kV Ckt 1 Reconductor	Reconductor 1.4-mile 115 kV line from Doud Tap to Wolf Tap to achieve a new rating of 276/304.	No	24	2021	2023	2023	$643,321	SPP	526162	LP-DOUD_TP 3	526481	SP-WOLF_TP 3	1	115			1.4		276/304
	TX	Wolf Tap - Yuma 115 kV Ckt 1 Reconductor	Reconductor 0.8-mile 115 kV line from Wolf Tap to Yuma to achieve a new rating of 276/304.	No	24	2021	2023	2023	$367,612	SPP	526481	SP-WOLF_TP 3	526475	YUMA_INT 3	1	115			0.8		276/304
	TX	Hughes Springs - Jenkins REC T 69 kV Ckt 1 Rebuild	Rebuild 4.8 miles to 959.6 ACSR/TW. Upgrade jumpers at Hughes Springs.	No	24	2021	2023	2023	$3,365,848	SPP	508291	HUGHES 2	508293	JENKNST2	1	69	69		4.8		123/143
	TX	Cochran 115 kV Cap Bank	Install 28.8 Mvar capacitor bank at Cochran 115 kV bus.	No	12			2015	$1,401,906	SPS	526361	COCHRAN 3			1	115	115				28.8 Mvar
	TX	Center 345/138 kV Ckt 1 Transformer	Install new 345/138 kV 314 MVA transformer at Center substation. Install any necessary 138 kV terminal equipment.	No	48			2023	$10,516,124	SPP	509048	CENTER 9	509058	CENTER 4	1	345/138	138				314/366
	TX	McLean - Wheeler 115 kV Ckt 1	Construct new 35-mile 115 kV line from Wheeler to McLean to achieve a rating of 180/199 MVA.	No	36			2023	$25,823,814	SPP	523811	MCLEAN 3	523776	WHEELER 3	1	115	115	35			180/199

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Requested BOD Action*	State	Upgrade Name	Project Description/Comments	Issue NTC	Project Lead Time (Months)	50/50 Project Start Year	50/50 Year	90/10 Year	Cost Estimate	Cost Estimate Source	From Bus Number	From Bus Name	To Bus Number	To Bus Name	Ckt	Voltages (kV)	Cost Allocation Voltage (kV)	Miles of New	Miles of Recon /Rebuild	Miles of Voltage Conv	Rating
	TX	Lubbock South - Woodrow 115 kV Ckt 1 Reconductor	Reconductor Line - 5.98 miles. 115 kV - Lubbock South - Woodrow for 477 ACSS rated 276/304 MVA	No	24			2023	$2,747,898	SPP	526268	LUBBCK_STH 3	526602	SP-WOODROW 3	1	115	115		5.98		276/304
	TX	Big Sandy - Hawkins 69 kV Ckt 1 Rebuild	Rebuild 5.5 miles to 1233.6 ACSR/TW. New ratings 123/143 MVA.	No	24			2023	$3,856,701	SPP	508335	BIGSNDY2	508344	HAWKINS2	1	69	69		5.5		123/143
	TX	Mineola - Grand Saline 69 kV Ckt 1 Rebuild	Rebuild 13.8 miles to 959.6 ACSR/TW. Upgrade CT ratios at Mineola and jumpers, CT ratios, and relay settings at Grand Saline. New ratings 64/94 MVA.	No	24			2023	$9,676,813	SPP	508342	GRANDSL2	508347	MINEOLA2	1	69	69		13.8		64/94
	TX	North Mineola - Quitman 69 kV Ckt 1 Rebuild	Rebuild 8.6 miles to 959.6 ACSR/TW and upgrade bus, jumpers, CT ratios and relay settings at Quitman. New ratings 64/94 MVA.	No	24			2023	$6,030,478	SPP	508348	NMINEOL2	508353	QUITMAN2	1	69	69		8.6		64/94
	TX	Adora - Adora Tap 138 kV Ckt 1 Rebuild	Adora T - Adora - Winfield: Rebuild 6.5 miles to 959.6 ACSR/TW. Upgrade CT ratios at Winfield. New ratings 137/137.	No	24			2023	$981,706	SPP	508284	ADORA 2	508285	ADORA T2	1	69	69		1.4		137/137
	TX	Adora - Winfield 138 kV Ckt 1 Rebuild	Adora T - Adora - Winfield: Rebuild 6.5 miles to 959.6 ACSR/TW. Upgrade CT ratios at Winfield. New ratings 137/137.	No	24			2023	$3,576,213	SPP	508284	ADORA 2	508315	WINFIEL2	1	69	69		5.1		137/137
	TX	Blocker - Blocker Tap 69 kV Ckt 1 Reconductor	Reconductor 0.7-mile 69 kV line from Blocker to Blocker Tap.	No	24			2023	$271,612	SPP	509053	BLOCKER2	509055	BLOCKRT2	1	69	69		0.7		134/156
	TX	Rockhill 138/69 kV Ckt 2 Transformer	Install 2nd 138/69 kV 103 MVA transformer at Rockhill.	No	24			2023	$2,810,198	SPP	509083	ROKHILL4	509082	ROKHILL2	1	138/69	69				93/103
	TX	Lone Star South - Pittsburgh 138 kV Ckt	Upgrade CT's on Pittsburg: Pittsburg New ratings 362 MVA	No	12			2023			508297	LSSOUTH4	508313	PITTSB_4	1	69	69				362/362

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Requested BOD Action*	State	Upgrade Name	Project Description/Comments	Issue NTC	Project Lead Time (Months)	50/50 Project Start Year	50/50 Year	90/10 Year	Cost Estimate	Cost Estimate Source	From Bus Number	From Bus Name	To Bus Number	To Bus Name	Ckt	Voltages (kV)	Cost Allocation Voltage (kV)	Miles of New	Miles of Recon /Rebuild	Miles of Voltage Conv	Rating
		1 Terminal Upgrades																			
	TX	New Prospect - Rockhill 138 kV Ckt 1 Terminal Upgrades	Replace Rock Hill circuit breaker, wave trap, jumpers and relay. New emergency rating 331 MVA.	No	12			2023			509083	ROKHILL4	509102	NEWPROS4	1	138	138				246/331
	TX/LA	Center - Dolet Hills 345 kV Ckt 1	Construct new 45-mile 345 kV line from Center to Dolet Hills.	No	48			2023	$58,875,915	SPP	509048	CENTER 9	500250	DOLHILL7	1	345	345	45			

Table C.1: HPILS Project List

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Appendix D: Zonal Customer Definition for APC Calculation

SPP Transmission Service Customer List	
Short Name	**Long Name**
AECCAEPW	Arkansas Electric Coop Corp. (AEPW)
AECCOKGE	Arkansas Electric Coop Corp. (OKGE)
AECCSWPA	Arkansas Electric Coop Corp. (SWPA)
AEPW	American Electric Power System West
COOPS	Coops and Munis in SPS
EMDE	Empire District Electric Co.
ETEC	East Texas Electric Cooperative
GINPPD	City of Grand Island 640
GMO	Greater Missouri Operations Company
GOLDEN	Golden Spread Electric Coop
GRDA	Grand River Dam Authority
HASTNPPD	Hastings Utilities 640
INDN	Independence Power & Light Dept.
KACY	Kansas City Board of Public Utilities
KCPL	Kansas City Power & Light Co.
KEPCSUNC	Kansas Electric Power Coop. Inc. in SUNC
KEPCWERE	Kansas Electric Power Coop. Inc. in WERE
KPPWERE	Kansas Power Pool in WERE
LES	Lincoln Electric System
LUBBOCK	Lubbock Power and Light
MEANNPPD	Municipal Energy Agency of NE 640
MIDW	Midwest Energy Inc.
MKEC	Mid-Kansas Electric Co. LLC
NPPD	Nebraska Public Power District
OKGE	Oklahoma Gas & Electric Company
OMPA	Oklahoma Municipal Power Authority
OPPD	Omaha Public Power District
OPPDMUNI	OPPD Muni
OTHSPP	Other Entities-in SPP
SPCIUT	City Utilities of Springfield (Springfield, MO)
SUNC	Sunflower Electric Power Corp.
SWPS	Southwestern Public Service Company
WEFA	Western Farmers Electric Cooperative
WRI	Westar Energy
Other SPP List	
Short Name	**Long Name**
SWPA	Southwestern Power Administration

Table D.1: Zonal Customer Definition

Appendix E: Economics Needs Assessment

2023 Needs Assessment

An economic project needs assessment to identify the most congested flowgates was completed on the 2023 50/50 HPILS scenario based on the Tuco-Amoco-Hobbs 345 kV New Mexico reliability alternative. Prior to identifying the most congested model flowgates, reliability solutions developed based on the 2014 ITPNT and the HPILS reliability assessment were incorporated into the model. The most congested flowgates were then identified based on the average hourly shadow price of the binding element. The needs list sorted by congestion cost is displayed in Table E.1.

Constraint	Constraint Area(s)	Event (Contingency)	Binding Hours	Avg Shadow Price ($/MWh)	Congestion Cost ($/MW)
PECOS 3 Transformer 115 kV	SWPS	528094[7-RIVERS 3115.0	3,054	$806	$2,462,125
RANDALL 3 - CANYON_EAST3 115 kV	SWPS	BUSHLAND 230-DEAFSMIT 23	4,773	$422	$2,013,070
PECOS 6 Transformer 230 kV	SWPS	528094[7-RIVERS 3115.0	1,632	$858	$1,401,056
EDDY_SOUTH 6 Transformer 230 kV	SWPS	527793[EDDY_STH 3115.0	549	$1,348	$740,218
AVOCA 5 - EROGERS5 161 kV	AECCAEPW-AEPW	SHIPERD7 345-KINGRIV7 34	3,321	$135	$447,411
HAYNE3 - CIM-PLT3 115 kV	KEPCSUNC-MKEC	CMRIVTP3 115-E-LIBER3 11	2,779	$135	$375,187
PLANT_X 6 Transformer 230 kV	SWPS	525531[TOLK_WEST 6230.0	585	$470	$274,737
PLANT_X 3 Transformer 115 kV	SWPS	525531[TOLK_WEST 6230.0	162	$990	$160,416
MONUMENT 3 - W_HOBBS 3 115 kV	SWPS	MADDOX 115-SANGER_S 115	185	$749	$138,624
MINGO 7 Transformer 345 kV	SUNC	MINGO 7 345-SETAB 7 34	1,266	$101	$127,840
S-DODGE3 - W-DODGE3 115 kV	MKEC	BASE CASE	3,162	$25	$79,634
CENTENL5 - PAOLA 5 161 kV	KCPL	WGARDNR5 161-PLSTVAL5 16	816	$91	$74,196
N-DODGE3 - EDODGE 3 115 kV	SUNC-MKEC	BASE CASE	3,026	$24	$73,612
SAN_ANDS_TP3 - DENVER_S 3 115 kV	SWPS	527149[MUSTANG 6230.0	49	$1,449	$71,015

Table E.1: 2023 50/50 Economic Needs Identification

2018 Needs Assessment

An economic project needs assessment was also completed on the 2018 50/50 HPILS scenario. The needs list sorted by congestion cost for this simulation is displayed in Table E.2.

Constraint	Constraint Area(s)	Event (Contingency)	Binding Hours	Avg Shadow Price ($/MWh)	Congestion Cost ($/MW)
RANDALL 3 - CANYON_EAST3 115 kV	SWPS	BUSHLAND 230-DEAFSMIT 23	4,309	$219	$944,938
KERR GR5 - SALINA 5 161 kV	GRDA	KERR GR5 161-SALINA2 161	185	$500	$92,500
HAYNE3 - CIM-PLT3 115 kV	KEPCSUNC-MKEC	CMRIVTP3 115-E-LIBER3 11	980	$80	$78,266
MINGO 7 Transformer 345 kV	SUNC	MINGO 7 345-SETAB 7 34	1,051	$69	$72,249
CENTENL5 - PAOLA 5 161 kV	KCPL	WGARDNR5 161-PLSTVAL5 16	983	$57	$56,281
S-DODGE3 - W-DODGE3 115 kV	MKEC	BASE CASE	3,026	$16	$48,602
N-DODGE3 - EDODGE 3 115 kV	SUNC-MKEC	BASE CASE	3,004	$15	$45,986
S.W.S.-4 - WASHITA4 138 kV	AEPW-WEFA	GRACMNT4 138-ANADARK4 13	1,366	$32	$43,917
AVOCA 5 - EROGERS5 161 kV	AECCAEPW-AEPW	SHIPERD7 345-KINGRIV7 34	732	$49	$35,828
GRACMNT4 - ANADARK4 138 kV	OKGE-WEFA	S.W.S.-4 138-WASHITA4 13	960	$28	$26,538
HOLCOMB7 Transformer 345 kV	SUNC	HOLCOMB7 345-SETAB 7 34	1,464	$13	$19,043
N.PLATT7 - STOCKVL7 115 kV	NPPD	GENTLMN3 345-REDWILO3 34	200	$69	$13,770

Table E.2: 2018 50/50 Economic Needs Identification

Because of time constraints and overlap with the ITP10 study, no economic needs were tested as part of HPILS.

Appendix F: New Mexico Shale Plays

Appendix F is provided as a separate PDF document that is available on **www.spp.org => ORG GROUPS => Transmission Working Group => High Priority Incremental Load Study (HPILS) Task Force => HPILS TF Meeting Materials**